MAYES'

AUSTRALIAN

ARCHITECTS BUILDERS and CONTRACTORS PRICE BOOK and GUIDE

ELEVENTH EDITION

ILLUSTRATED and ALPHABETICALLY ARRANGED

COPYRIGHT

for quality, specify and use

WUNDERLICH

Building Materials

including

METAL PRODUCTS

Metal Stamping, Architectural Metalwork, Industrial Metalwork, Non-ferrous Castings (Architectural and Industrial), Pressed and Welded Metalwork, Metal Ceilings and Fascias, Metal Windows, Doors and Doorframes, Pressed Steel Partitions, Stainless Steel Sinks and Drainers, Metal Kitchen Cabinets, Metal Tile Roofing, Metal Letters, Cast Enamelled and built, Nameplates, Honour Rolls, Memorials, Shopfront Mouldings, Glazing Bars, Skylights, Perforated Metals, Ventilators, Ventilating Sheets, Corrugated Utility Cans, Snap-on Mouldings, Mail Chutes and Letter Boxes, Window Hoods, Parkerising and Bonderising, Industrial Spray Painting, etc.

ASBESTOS-CEMENT PRODUCTS

"DURABESTOS" Flat Building Sheets, Cover Moulds and Angles, Corrugated Roofing Sheets, Ridge & Hip Capping, Barge Moulding, Flashings, Skylights, Roof Ventilators, Louvre Blades, Downpipes, Eaves and Box Guttering, Rainwater Heads, Flue Pipes and Fittings, "Duratile" Wall Tile Sheets, "Insulabestos" Sheets.

CLAY (TERRA-COTTA) PRODUCTS

Roofing Tiles, Fireplace Brickettes, Wall Ventilators, Chimney Pots, Stoneware Pipes and Fittings, Ceramic Veneer, Ceramic Wall Tiles, Fireplace Surrounds, Paterae, Roundels, Vases, etc.

Price Lists, Catalogues, Quotations, etc., furnished on request to our nearest office.

WUNDERLICH LIMITED

MANUFACTURERS

SYDNEY, MELBOURNE, BRISBANE, ADELAIDE, NEWCASTLE (N.S.W.), HOBART, LAUNCESTON.

Perth Associates:
H. L. BRISBANE & WUNDERLICH LTD.

Build Faster . .
at Less Cost —
in "ECONO-STEEL"

For Architects, Engineers and Builders who "need something under cover in a hurry" and conforming to sound structural principles, Econo-Steel Company, of Rhodes, provides ready-fabricated components for most requirements. These are drawn from stock, and cover a wide range of designs in DOMESTIC and INDUSTRIAL fields.

You are invited to send for our Architectural files on nailable steel frames, application of all forms of coverings and fixings to nailable steel lumber, and for metal roofing, walling, etc. Our skilled erection teams erect "Econo-Steel" anywhere, and highly trained personnel are available for your guidance.

THE ECONO-STEEL COMPANY

(A DIVISION OF TULLOCH LTD.)
HEADQUARTERS, DISPLAY CENTRE & PLANT
CONCORD ROAD, RHODES, SYDNEY, N.S.W.

Telegrams:
"TULLSTEEL," SYDNEY.

Telephones:
UF 1231 (6 lines), UF 1308-9.



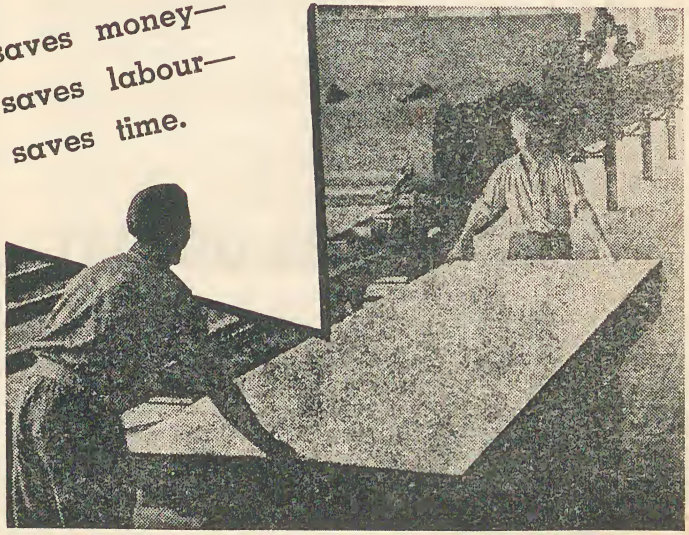
BUILDERS who know
"ECONO-STEEL"
prefer it—as there is
NO WASTE in TIME,
MATERIALS or MEN

and now we're making

a new product

"MASONITE PRIMECOTE"

saves money—
saves labour—
saves time.



Masonite Primecote is Standard Presdwood, roller-coated, as part of the manufacturing process, with a specially developed water-base paint. Oil, lacquer or enamel finishes can be applied to Masonite Primecote with equally good results. Only two finishing coats are necessary for a first-class job.



MASONITE CORPORATION (AUSTRALIA) LIMITED

Sales and Service Division:
369 Pitt Street, SYDNEY ● 533 Collins Street, MELBOURNE.
282 Queen Street, BRISBANE ● 31 Chesser Street, ADELAIDE.

ARCHITECTS BUILDERS
ENGINEERS CONTRACTORS

KEEP YOUR PRICES UP-TO-DATE!

Subscribe to

"The N. S. W. CONTRACT REPORTER"

(ESTABLISHED 1895)

The Oldest Building Trade Paper in Australia:

CURRENT WEEKLY PRICE LISTS
CONTRACTS OPEN
CONTRACTS ACCEPTED
LATEST IN BUILDING PRACTICE
SHIRE COUNCIL REPORTS
CARTAGE RATES
CURRENT AWARDS
and
OTHER USEFUL INFORMATION

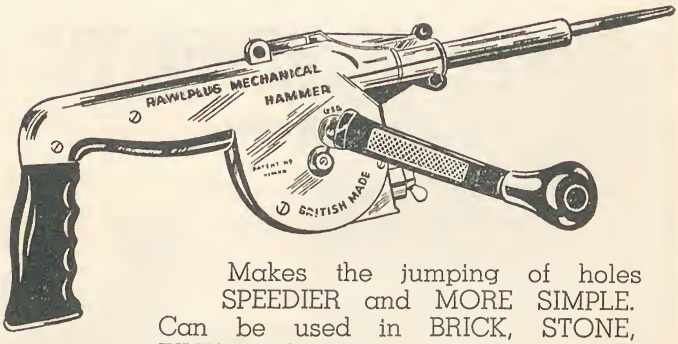
•

Annual Subscription 42/- (posted)

•

"CONTRACT REPORTER,"
122 CHALMERS STREET, SYDNEY, N.S.W.
Phone: MX 1447.

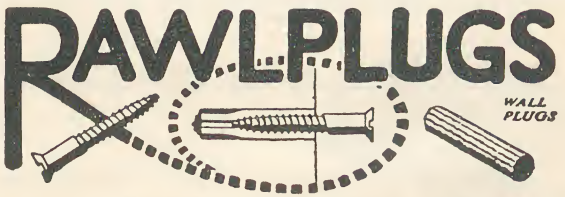
The *Rawlplug*
MECHANICAL HAMMER



Makes the jumping of holes SPEEDIER and MORE SIMPLE. Can be used in BRICK, STONE, TILES, ETC.

With the aid of this efficient, time-saving unit a hole 2" long x ¼" diameter can be made in the hardest material in approximately 30 seconds. Holes ⅛" x ⅜" to suit Rawlplugs Nos. 3-20 can be easily made by merely rotating the handle, and the power of the blow can be regulated by turning the fly-nut.

Available At All Leading Hardware Stores.

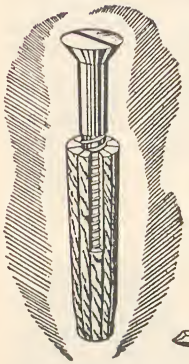


THE RAWLPLUG CO. LTD., LONDON.

The World's Largest Manufacturers of Fixing Devices.
Sole Australian Agents: SLADE, ALLAN & CO. PTY. LTD.
Sydney, Melbourne, Brisbane.

Keep them in their place . .

with RAWLPLUG FIXING DEVICES



● ***Rawlplugs*** are ideal for almost any fixing job. The plug is waterproof and, when the screw is driven into it, expands and grips like a vice. This is the speediest and neatest method yet devised for the Builder, Electrician or amateur fixer.

● ***Rawlbolts*** make firm bolt fixings and minimise time, tools and labour. Simplicity has been foremost in their design, for as soon as the bolt is tightened, the bolted-down unit is ready for use. There is no waiting for cement to dry.



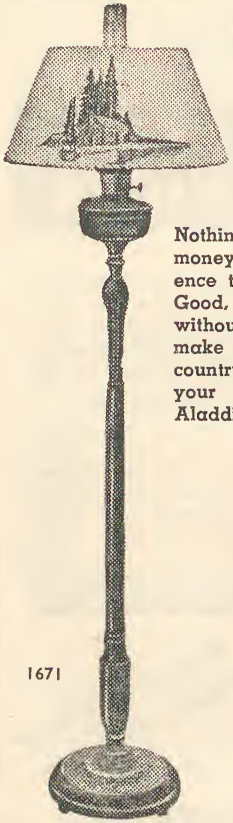


● ***Rawldrills*** or "jumping bits" are another invaluable timesaver. They are hardened and tempered by a special process and are made from special steel to ensure a dead-hard point. Rawldrills give excellent results on brick, concrete, tile or any hard material and reject dust automatically by special fluting.

RAWLPLUGS WALL PLUGS

OTHER RAWLPLUG PRODUCTS include: Rawlties, Rawlhangers, Rawlnuts, Durium Masonry Drills, Rawlhooks, Bathroom Fittings, Plastic Wood and Durofix.

THE RAWLPLUG COMPANY LIMITED, LONDON
Sole Australian Agents: SLADE, ALLAN & CO. PTY. LTD.
Sydney, Melbourne, Brisbane.



1671

LIGHTS THE WAY TO BRIGHTER LIVING!

ALADDIN MANTLE LAMPS

Nothing you can buy for an equal amount of money will add so much comfort and convenience to your home as Aladdin kerosene lamps. Good, bright, steady white light; 75 candle power without pumping, smoke or odour! Aladdin make these city comforts easily available for country homes. Decide now to "Aladdin-ise" your home with these efficient, easy-to-use Aladdin products.



163(



1609

Illustrated are the models 1671 (standard), 1630, 1609, which are readily available from authorised Aladdin distributors in all cities, suburbs and country towns throughout the Commonwealth.

★

Aladdin

ALADDIN INDUSTRIES PTY. LTD.,
61-71 Bourke Street, Waterloo, N.S.W.

LIGHTING AND COOKING MADE EASY ! with

Aladdin

PRESSURE KEROSENE APPLIANCES



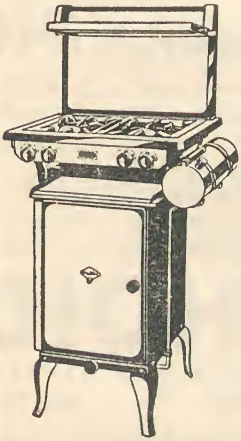
STORMPROOF LANTERN

gives a brilliant area of light with standard lighting kerosene—200 candle power! Safe, economical, reliable for outdoor illumination under any conditions. Down or side reflectors available.

PORTABLE 2-BURNER STOVE

Efficient pressure kerosene stove for cooking under any conditions. Two adjustable self-pricking burners—economical kerosene consumption. Useful emergency stove in the home. Metal windshield forms compact carrying case.

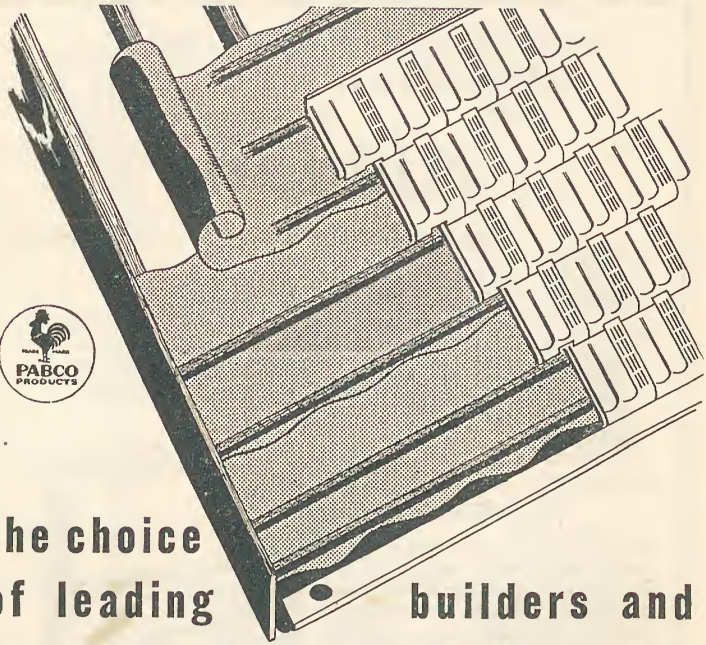




5-BURNER RANGE

Here's modern convenience for country homes. Handsome porcelain-finished stove —kerosene-fueled, completely odourless and simple to operate. Five adjustable, self-pricking burners, economical fuel consumption.

Products of
ALADDIN INDUSTRIES PTY. LTD.,
61-71 Bourke Street, Waterloo, N.S.W.



the choice of leading builders and contractors for over 40 years

MALTHOID SARKING

Leading builders and contractors sark with Malthoid because it ensures that the roof is permanently watertight; because the possibility of expensive water-damage to walls and ceilings is eliminated; because its use means enhanced property value and satisfied clients. Malthoid, famous as an external roofing, is the perfect sarking. Discuss Malthoid Sarking with our experts.

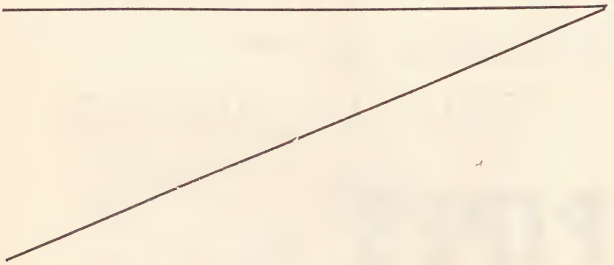
PABCO MALTHOID

Manufactured by **PABCO PRODUCTS PTY. LIMITED**
150 WIGRAM ROAD, GLEBE, N.S.W. — MW 2424

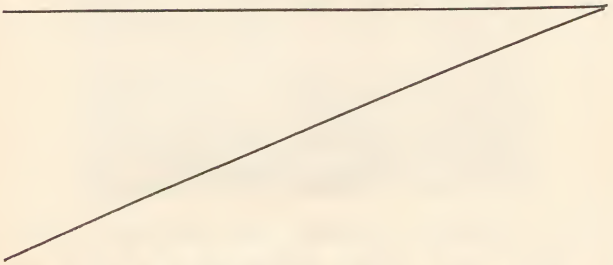
Sole Manufacturers of Genuine MASTIPAVE Floor Covering.

P16-48

LIFTS and ESCALATORS



For All Purposes



WAYGOOD LIFTS LTD.

80-100 BOURKE STREET
WATERLOO, N.S.W.

SPIERS & SONS: 173 Eagle Street, Brisbane.

EDMUNDS, MOIR & CO. PTY LTD.
53 King Street, Newcastle.

HUMES LIMITED

(INCORPORATED IN VICTORIA.)

[FORMERLY HUME PIPE CO. (AUST.) LTD.]

Manufacturers of

CONCRETE PRODUCTS

PIPES for

STORMWATER, DRAINAGE,
SEWERAGE, WATER SUPPLY

also

SHEEP, HORSE and CATTLE
TROUGHING

SEPTIC TANKS and FILTERS
WELL LININGS
ETC.

OPERATING THROUGHOUT AUSTRALIA & NEW ZEALAND.

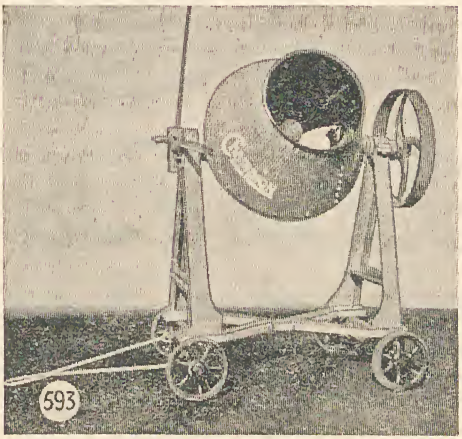
Head Office for N.S.W.:
43 MARGARET STREET, SYDNEY. PHONE: BX 4165.

Factories:—ADAMSTOWN, GRAFTON, HARDEN, LISMORE, QUEANBEYAN, RYDALMERE, TAMWORTH.

"ARMSTRONG - HOLLAND" and "CHAMPION"

CONCRETE MIXERS AND BUILDERS' MACHINERY

ALSO EARTHMOVING AND CONSTRUCTION EQUIPMENT.



Manufactured in Australia for Australian Conditions by

ARMSTRONG - HOLLAND PTY. LTD.

4 BRIDGE STREET, SYDNEY.
Phone: BU 3225 (5 lines).

Distributors:

ARMSTRONG-HOLLAND (MELB.) PTY. LTD.
72 Market Street, South Melbourne.
QUEENSLAND MACHINERY CO. LTD., BRISBANE.
INDUSTRIAL SALES & SERVICE (W.A.) LTD., PERTH.
INDUSTRIAL SALES & SERVICE (TAS.) LTD., HOBART.
INDUSTRIAL SALES & SERVICE (S.A.) LTD., ADELAIDE.
NEWCASTLE LIME & CEMENT CO. LTD.

Manufacturers of Ceramics for over a century



Fowler Ware

ALWAYS ABREAST IN DESIGN TO MEET ARCHITECTURAL TRENDS

•

For details of Fowler products see pages 411 *to* 415

•

R. FOWLER LIMITED

Showrooms and Potteries:
MARRICKVILLE, N.S.W.; ALDERLEY, QLD.;
THOMASTOWN, VIC.; CUDMORE PARK, S.A.

"SISALKRAFT"

Made in Australia for Australian Conditions.

Sisalkraft is a reinforced air and waterproof fabric, light in weight but intensely strong owing to its internal reinforcement of 2808 lin. ft. (over ½ mile) of Sisal fibre to each sq. yard of material. It is in general use throughout the World for a multitude of purposes. In the following building uses the Economy and Service of Sisalkraft Products have been proven:

Concrete Curing
Underlay for Concrete
Under Terrazzo
Backing to Stucco
Sheathing Brick Veneer
Refrigeration
Sarking
Under Mastic Roofing

Sheathing Behind Weatherboard and Cement Sheet

Under Wooden Floors over Concrete

Lagging Tape or Insulation Wrap

Protection During Alteration and Construction

Waterproofing Between Solid Walls and Wood Panelling

Separation Sheet Between New and Old Walls

Concrete Form Lining
Sarking Under Flat Iron Roofs
Under Floor Coverings

Samples, Literature and Specifications from:—

F. W. WILLIAMS & CO. PTY. LTD.

16 LOFTUS STREET :: **SYDNEY**

Manufacturers:

THE AUSTRALIAN SISALKRAFT CO. PTY. LTD.

Mills: WATERLOO, N.S.W.

IT PAYS TO SPECIFY



HARDIE'S *Genuine* FIBROLITE

(ASBESTOS CEMENT)

FLAT SHEETS : For exterior and interior walls, ceilings, partitions, gable-ends, eaves soffits, etc.

CORRUGATED SHEETS : For roofing and siding factories and buildings of all types.

"TILUX" : The "marble-finished" wall panel for bathrooms, kitchens, surgeries, shops, etc.

✲ **For over 30 years the name HARDIE'S "FIBROLITE" has been recognised in the building trade throughout Australia and New Zealand as the hall-mark of Quality and Dependability in asbestos-cement building materials. Make SURE of getting the best in asbestos-cement by always specifying and insisting on HARDIE'S GENUINE "FIBROLITE."**

Sole Manufacturers :

JAMES HARDIE & COY. PTY. LTD.

"Asbestos House,"

YORK AND BARRACK STREETS, SYDNEY

And at Newcastle, Melbourne, Brisbane, Perth and Auckland.

BEST FOR OVER 30 YEARS

THE AUSTRALIAN
ARCHITECTS, BUILDERS
AND CONTRACTORS

PRICE BOOK

AND

GUIDE

ELEVENTH EDITION

REVISED UP-TO-DATE
ALPHABETICALLY ARRANGED

BY

PHILLIP MAYES

Builder and Contractor

This Book is sold to the Trade on the understanding that it must be sold at the published price of **47/6** per copy

May be obtained from all Booksellers

Printed and distributed by Simmons Limited, 31-33 Parramatta Rd., Glebe, N.S.W.

1951



Introduction by the Author

THIS book was first published in 1859 by my grandfather, Chas. Mayes, a pioneer civil engineer and architect, and, prior to his death six revised editions were published.

My father, the late Charles Ernest Mayes, brought out the 7th, 8th, 9th and 10th revised editions at various intervals. I assisted him with the 9th and 10th Editions.

In revising and preparing the Eleventh Edition, I have used a method of pricing in detail, so that any slight variation in prices of individual items can be quickly adjusted without altering the other items.

This book is a PROVED AND STANDARD work and commands a ready sale throughout the entire building trades.

A comprehensive general index shows contents of subject, together with a separate index for quick reference to the numerous tables which appear throughout this work.

PHILLIP MAYES

Brookvale, N.S.W.

Copyright

PREFACE

IN reconstructing and revising this 11th Edition of MAYES' AUSTRALIAN ARCHITECTS, BUILDERS AND CONTRACTORS PRICE BOOK AND GUIDE, special care has been taken to make all statements as correct as possible, and, where necessary, articles have been specially prepared by recognized authorities in the various sections of the Building Trade.

Fixed prices adapted to all circumstances are impossible. Contractors and tradesmen must use their judgment regarding accessibility of jobs, difficult working in cramped positions, part time working in business premises, where partial interference in work prevails, etc., and must allow extra for work under these conditions.

Costs prices under average circumstances are quoted, leaving the contractor to add what he considers a fair margin to cover profit and incidental expenses.

The value of this publication is as a book of reference where nett cost of work can be ascertained, and is thus a guide to and also a check upon contractor's own prices and methods.

When an immediate tender or approximate price is required, this book is specially valuable to obtain this price, without waiting on the cost from another source. To Architects, Builders, Engineers and Quantity Surveyors this book will prove valuable, not only for the many tables, weights, quantities and other essential data it contains, but as a book of reference as to material and labour costs for pricing various jobs. Shire Councils, Building Loan institutions and Building trade firms will find the book a useful addition to their libraries as a book of reference. Tradesmen, Trainees and Agents engaged in selling building materials will find it of great assistance to increase their knowledge of building practice. The various tables, weights of materials, setting out roofs and many other articles of information included in this book, will help to make an efficient tradesman.

The author will be pleased to receive suggestions that would add to the value of this work and so be of greater benefit to those for whom it is published. Any reference to names of agents, manufacturers, trade or registered names of materials is for the convenience of contractors and not for advertising purposes.

The advertisement pages of this book will assist contractors seeking advice or information on building materials or appliances. Most firms have a technical service at your disposal, and readily answer any questions on problems related to their particular type of material or appliance.

The award rates of labour of all the building trades are derived from the basic wage rate; thus an increase of 1/- in the basic wage represents an increase of 1/- on all wages.

Some building materials work on a base cost which remains constant, and any increase in price is made by increasing the surcharge. In all examples of cost the surcharge has been kept separate so that it can be adjusted. By this means, costs can be kept accurate with very little trouble.

Another good plan used by architects, builders and contractors of all kinds is to subscribe to the excellent weekly publications (see advts. pages 3 and 34) on architecture, building and engineering which, besides containing other useful information, embody a current price list of materials. Any marked change in prices can be noted immediately in this book.

In conclusion, I have to thank the many experts and authorities in various spheres of building construction who have rendered to me valuable assistance in the preparation of this edition, and thanks to Malcolm S. Stanley, A.M.I.E. (Aust.); B. R. Newton-Tabrett, B.E., A.M.I.E. (Aust.) and R. Hvass, Quantity Surveyor, for their able assistance in compiling and checking various data in this book. Also thanks to the many firms for their friendly co-operation in checking costs and supplying technical data to make this book an essential book to Australian Building and Construction practice.

Sydney, 1951. PHILLIP MAYES.

CONTENTS

A

Page

Air Conditioning ... 474-479
Aluminium ... 338-340
Asbestos Cement Building Materials ... 7-28
Asphalt ... 29, 30
Awards, State ... 537, 538
Awnings, Shop ... 319-324
,, Specifications ... 321-324

B

Ballast, Metal and Sand ... 36
Belting ... 37-39
Blasting and Explosives ... 244-251
Bricklayer ... 40-56
Brick Veneer Homes ... 385-386
Brickwork Reinforcement ... 57-58
Builders' Contract Prices ... 84-87
Builders' Hardware ... 508,509
Builders' Stationery ... 507
Building Boards ... 88-91
Bush and Country Work ... 66-83

C

Canvas Goods ... 163-166
Carpenter ... 92-135
Cartage and Transport ... 167-169
Cement and Concrete ... 176-203
Cements, Acid Proof ... 173
Cements, Refractory ... 170-173
Cements, Waterproof ... 173-175
Ceramic Facings ... 374
Chemical Action on Concrete ... 195, 196
Cleaning Down Brickwork ... 58-59
Composition and Bituminous pavings ... 31-35
Compressed Air ... 216, 217
Concrete, Reinforced ... 204-215
Constants of Labour Tables ... 341-347
Costing and Tendering ... 4-6

D

Dampcourses ... 60, 61
Drainer ... 218-228

E

Electrical ... 252-284
Electric Supply Stations ... 276-282
Estimating Table ... 5
Excavator ... 229-238
Explosives and Blasting ... 244-251
Extinguishers, Fire ... 437-439

F

Facings to Buildings ... 374
Fees and Charges ... 515-517
Fibrous Plaster ... 383-384
Fire Doors and Extinguishers ... 436-439
FIRST AID ... 539-541

G

Glass Bricks ... 285-288
Glazier ... 289-296
Glued Laminated Timber ... 154, 155

H

Heating and Lighting ... 423-429
Home Purchase Loans ... 509-511
Hot Water Systems ... 423-427
Hydraulics ... 480-487

I

India Rubber ... 447-448
Insect Pests in Timber ... 532, 533
Insulation ... 297
Insurance ... 512-515
Ironworker ... 298-312

J

Joiner ... 136-153

	Page
L	
Labour Constants	341-347
Lifts and Escalators	348-352
Lighting and Heating	423-429
M	
Magnesite Pavings	33-34
Marble Mason	356
Masonry	353-356
Metal Work	326-340
N	
Neon Lighting	430
P	
Painter	357-370
Paperhanger	371-372
Partitions	336, 373, 374
Pavings, Composition	29-35
Pile Driving	488-490
Plan Copying	507
Plant and Tools	518-524
Plasterer	375-383
Plumber	387-422
Plywoods	156-162
Pointing and Cleaning Down	58-59
Porcelain Enamel Panels	462
Pumps and Hydraulics	480-487
Q	
Quantities and Measurements	1-3
Quantity Units for Measurement	2
Quarrying	239-243
R	
Ready Reckoner	560
Refrigeration	474-479
Reinforced Concrete	204-215
Roads and Pavements	491-504
Rock Crushers	241
Roller Grilles and Shutters	431-435
Roof Tiler and Shingler	440-446
Roofs, Setting Out	118-122
Ropes and Blocks	448-458
S	
Sanitation	463-473
Scaffolds, Tubular Steel	62-65
Septic Tank, Working Plan	465, 466
Setting Out Foundations	3
Setting Out Roofs	118-122
Shop Fronts	152-153
Sliding Doors	431-435
Staircases	150-152
State Awards	537, 538
Steel Ceilings	330,331
Structural Steel	313-325
T	
Tables, useful	542-560
Tar Paving	30
Terra Cotta Lumber	373-374
Terrazzo	34, 35
Tiler, Roof	440-446
Tiler, Wall and Floor	459-462
Timber for Building Purposes	525-531
U	
Useful Tables and Memoranda	542-560
V	
Ventilation	474-479
Vocational Training Courses	511
W	
Waterproof Cements	170-175
Weights of Building Materials	534-536
Well Sinking	76-78
Windmills	71
Wire Fences and Gates	126
Wire Worker	505-507
Wrought Iron and Steel	298-312

GENERAL INDEX

Page

A

Absorption Trenches 473
Accordion Doors 433, 435
Acoustic Plaster 297
Acoustic Tiles 90
Acre of Land Tables 66
Acre, trees to the 67
Aggregate for Concrete ... 177-179
Agricultural Pipes 224
Air Bricks 54
Air Compressors 216
Air Conditioning 474-479
Air Pressure Table 479
Airlite Insulating Concrete ... 297
Aladdin Lamps, Heaters and Stoves 428, 429
Alloys of Metals 334, 339
Aluminium 338-340
,, Gutters and Downpipes ... 395, 396
,, Mouldings 28
,, Paint 33
,, Windows 327
Aluminium Armoured Plywood ... 162
Anaglypta Cover Strip 90
Anchor Bolts 134
Angle and Tee, Iron ... 310, 311
Angles of Inclination 230
Angle of Rest—excavated Material 230, 536
Angles with 2 foot rule 153
Anti-Ant Caps 47
Arbitration Act Requirements ... 507
Architects Fees and Charges ... 516
Areas of Rods and Bars ... 191, 192
Armoured Fire Doors 436
Asbestos Cement Building Materials 7-28
,, ,, Cartage Rates ... 10
,, ,, Covering Capacity 16, 17
,, ,, Curved Sheets ... 17
,, ,, Dripstrip... ... 10
,, ,, Exhaust Ventilators 22
,, ,, Flashing ... 20, 24
,, ,, Flue Pipes 25-27
,, ,, Gutter ... 21, 23
,, ,, Lagging 422
,, ,, Mouldings ... 10
,, ,, Rainwater Heads 23
,, ,, Roof Costs 18-20
,, ,, Roof Fixing 12-15
,, ,, Sidings 91
,, ,, Skylights ... 21
,, ,, Ventilating Ridge 23, 24
,, ,, Wall Costs 11, 12
,, ,, Wall Fixing ... 7-9
,, ,, Weights ... 26
Asphalt 29, 30
,, Cold and Hot Mix ... 30
,, Dampcourse 29
,, Floors 29
,, Floor Tiles 461
,, Pavements 31
,, Roofs 29, 31
,, Weights 30
Australian Ports—Distances Between 167
Automatic Water Heaters 422-427
Awards 537, 538
Awning Blinds 165
Awnings Specifications of ... 321-324
Awnings Steel 319-324
,, Types of 322, 323

B

Balances, Sash 143
Ballast, Metal and Sand 36
Bar and Round Iron Weights ... 193
Barbed Wire 505
Bars, Reinforcement 213
Basic Wage Adjustment Table ... 5
Basins, Cast Iron Enamel 414, 415
,, Earthenware ... 411, 412
Bath Heaters 422
Baths, Porcelain Enamel 414
Beams and Lintels—Concrete 213, 214
,, Steel 213, 214
Belting 37-39
Bevelling Glass 291, 292
Biological Treatment of sewage 463-473
Birmingham Wire Gauge 301
Bitulynd Pipes and Fittings 404, 405
Bituminous Dampcourse ... 60, 61
,, Paints 405
,, Pavings 30
,, Roofs 31
Blasting and Explosives ... 244-251
,, by Electricity ... 245-247
,, Cost of Drilling 250
,, depth of hole required ... 247
Blasts, Hole Placement Table ... 249
,, Weight of Explosives 248, 249
Blinds, Canvas 164, 165
Blocks, Building ... 183, 373, 374
Boards, Building 88-91
,, Superficial Tables ... 93-96
Bolts, Anchor 134
Bolts and Nuts, weights of ... 302
Bond Rod for Brickwork ... 41
Borer Immunisation Charges ... 99
Boxes, Concrete Measuring ... 185
Box Frames and Sashes ... 140-142
Brassware, High Pressure 416-421
B.R.C. Fabric 208, 209
B.R.C. Reinforcement 58
Bricanion Lathing 382, 383
Brickettes 50
Bricklayer 40-56
,, Labour Constants ... 342
Brickmaking Machine 56
Brick Paving 41, 49
Bricks, Air 54
,, Cement 56
,, Glass 285-288
,, Materials for 40
,, Precision 345, 346
,, Stacked, Cubic Content ... 40
,, Weight of 536
Brick Veneer Construction... 385, 386
Brickwork Bond Rod ... 41
Brickwork Chimneys ... 47, 48
,, Closet, Cost of ... 48
,, Contents of rod 40, 41
,, Copper, Cost of ... 49
,, Costs 43-49
,, Costs Table ... 53
,, Fireplaces ... 47, 48, 55
,, Footings 42
,, Hours required ... 42
,, Material Required 41, 43
,, Measurements 40

	Page
Brickwork Mortar for	40
,, Mortar, ready mixed	54
,, Piers	47
,, Pointing	58, 59
,, Reinforcement	57, 58
,, Soot Proofing Chimneys	40
,, Storey Rod	42
,, Tank, Specifications	56
,, Underpinning	552
,, Wall Tables	51
,, Weight in Walls	52
Brictor Reinforcement	58
Bridges, Concrete	504
,, Timber	504
Builders Contract Prices	84-87
,, Furnishing Hardware	508, 509
,, Stationery	507
Building Blocks	183, 373, 374
,, Boards	88-91
,, Loan Repayments	510
,, Materials, Weight of	534-536
,, Paper	297
Buildings, Prefabricated	135
Bulldozers	235
Bushel Measure of Silos	81, 83
Bush and Country Work	66-83

C

Cabinets, Steel	337
Cables, Electric	258-260
,, Permitted in Conduit	257
Cane-ite	90
Canvas Goods	163-166
Capacity of Pipes and Casing	73
,, ,, Round Vessels	73
,, ,, Silos	82, 83
,, ,, Tanks	70, 398
Caps, Stump	47
Carpenter	92-135
Carpenter, Labour Constants	343
,, Measurements	92
Cartage and Transport	167-169
,, Rates of Bricks	43
,, Rates of Timber	98
Casements, Steel	326
,, Timber	144-146
Casing, Rolled Steel Joists	214, 215
Cast Iron Columns, safe load	306
,, ,, Gutter	401
,, ,, Pipes	305, 401-403
,, ,, Pipe Weights	300
,, ,, Weight of	306
Castings, Shrinkage of	334
Castings, Weight from Patterns	299, 334
Caulking Compounds	305
Ceiling Joists—Timber	116
Ceilings, Corrugated Iron	393
,, Metal	330, 331
Cement and Concrete	176-203
Cement Aggregates	184, 185
,, Brickmaking Machine	56
,, Building Blocks	183
,, Colouring	196
,, Covering Capacity of	200
,, Curing	181
,, Gun	197-199
,, Measuring Boxes	185
,, Mixing and Pouring	176
,, Paths	379
,, Quantities for Mixes	186-189
,, Refractory	170-173

	Page
Cement Rendering	197
,, Roof Tiles	445, 446
,, Weights	184
Ceramic Veneer	374
Chain Wire Fencing	505
Chemical Action on Concrete	195, 196
Chimneys	47, 48
Chimney Pots, Terra Cotta	54
Circles, Areas and Circumferences	553-556
Circular Tank Contents	548
Circular Tanks	70, 73
Cisterns, Concrete	413
,, Earthenware	413
Cleaning Brickwork	58, 59
,, Paintwork	362
,, Stonework	58, 59
Closet Pans, Pedestal	412
Closets, Chemical	471, 472
Closet Systems	472
Coins, Weights and Measurement	517
Coke Breeze Blocks	373, 374
Colorcrete	380
Comparison of Solid Measurements	200
Composition Roofs and Floors	31-35
Compressed Air	216-217
,, ,, Tools & Machines	216, 217
Concrete, Action of Substances on	195, 196
,, Aggregates	177-179
,, Air-entrained	202
,, Blocks	183
,, Boxing for	203-207
,, Beams and Lintels	213, 214
,, Coefficients of Expansion	190
,, Colouring	196
,, Columns, Weights of	194
,, Covering Capacity	200
,, Curing	181
,, Drain Pipes	226-229
,, Floors and Slabs	210-213
,, Forms, Plasply	162
,, Formwork Costs	203-207
,, ,, Timber required	205
,, Kerb and Gutter	504
,, Lintels and Beams	213-214
,, Machinery	518-523
,, Materials per cubic yard	189
,, Measuring Boxes	185
,, Mixing and Pouring	176-181
,, Physical Characteristics	189
,, Pipes	226-228
,, Plant Hire Rates	207
,, Precast	182, 183
,, Proportions	179, 186, 187
,, Reinforced	204-215
concrete, Reinforcement	209, 210
,, Ready Mixed	202, 203
,, Roads	183, 501-503
,, Shrinkage of	190, 200
,, Slabs, Materials required	188
,, Suspended Floors	210-213
,, Troughs	78, 79
,, Tubs	415, 416
,, Water required for	201
,, Water Tight	182
,, Well Linings	76, 78
Concretor, Labour Constants	345
Conduit and Fittings	261-263
Constants for Estimating Earth	229
Constants of Labour	341-347
Content of Circular Tanks	548

Page

Contract Prices, Builders ... 84-87
Copper Alloys 334
,, Dampcourse 61
,, Ridging and Valleys ... 401
,, Tanks 400
,, Tubes 406
,, Water Service 406
Coppers, Washing 49
Cornices, Metal 331
Corrugated Asbestos Cement 12-20
,, Iron 387-391
Costing and Tendering 4-6
Cottages, Cost per Square ... 6
Cost of Steel Table 299
Council Fees and Charges 517
Covering Capacity of Asbestos Cement 16, 17
,, ,, ,, Concrete ... 200
,, ,, ,, Corrugated Iron 388-390
,, ,, ,, Flooring Boards ... 108
,, ,, ,, Lining Boards 103
,, ,, ,, Paints ... 360
,, ,, ,, Plaster 377, 378
Crushers, Stone 240-242
Cubes and Squares of Numbers 557, 558
Cubic Yards in Trenches Table 231, 232
Culverts, Reinforced Concrete ... 504
Cutting Glass Tubes 294
Cuttings and Embankments ... 229
Cupboards, Steel 337

D

Dampcourses, Various ... 60-61
Days Work, Tradesman 136
Decimals and Equivalents ... 544
Density of Timbers ... 530, 531
Diesel Engines 80, 81
Distances Between Ports ... 167
Doors and Frames, Timber... 137-140
Door Locks 508
Doors, Casement 139
,, Fire Resisting 436
,, Garage 137, 140
,, Ledge 139
,, Screen 136, 138
,, Sliding 433-435
,, Steel Casements ... 326
,, Timber 136, 137
Downpipes Asbestos Cement ... 23
,, Copper ... 400, 405
,, Galvanized Iron ... 391
Drainage Fees and Charges... 218, 219
Drainer, Constants of Labour ... 341
Drainer 218-228
,, Excavation Costs ... 223
,, Fees and Charges ... 218-219
,, Mortar for Joints 225
Drain Pipes Costs 219-222
,, ,, Concrete 226-228
,, ,, Recommended Falls... 225
,, ,, Schedule of Labour Costs ... 224, 225
,, ,, Weight of ... 224, 225
Drilling Holes in Glass 293
Dumbwaiters 350
Dux Bath Heaters 422

Page

E

Earth and Rock Weights ... 230
,, Closets 48
,, Electrodes 273, 274
,, Leakage Circuit Breaker 256, 273, 274
,, Leakage System 275
,, Measurement ... 229, 230
,, Moving Equipment 233-238
Earthenware Pipes and Fittings 219-221
Eaves, Boxed 125
,, Lining 125
Econo-Steel Construction ... 325
Electrical 252-284
,, Calculations ... 253, 254
,, Installation of Appliances 266-268
,, Terms 252
Electric Cables in Conduit ... 257
,, Cables 258-260
,, Conduit 261, 262
,, Heaters 422-427
,, Home Installations 264-272
,, Lighting Unit 282
,, Mains Costs ... 262-263
,, Materials for Wiring 255-256
,, Shot Firing ... 245-247
,, Soil Resistivity Table ... 274
,, Supply Stations ... 276-282
,, Switchboards ... 265, 266
,, Tools, Portable ... 283, 284
,, Wiring 262-275
Embankments and Cuttings ... 229
Enamel Paints 363, 364
Engines, Diesel 80, 81
Escalators 352
Excavated Increase of Earth ... 230
Excavated Material, Angle of Rest 230
,, ,, Contents of Trenches ... 222
Excavation in Trenches Costs ... 233
Excavator 230-238
Excavator Constants 341
,, Costs, Drainer 222-224
Exmet, Brickwork Reinforcement 58
Expanded Metal Lathing ... 383
Explosives 244-251
Extinguishers, Fire ... 437-439

F

Facings, Ceramic Veneer 374
Fact-o-tile Board 89
Fees and Charges 515-517
,, ,, ,, Drainage 218, 219
Felts, Bituminous ... 31, 32
Fencing, Barbed Wire 505
,, Chain Wire ... 126, 505
,, Contract Prices 86
,, Corrugated Iron ... 128
,, Paling 127
,, Park Rail 126
,, Picket 128
,, Posts, Per Mile 505
,, Ringlock 505
Fencing, Wire 505
,, ,, Per Mile 505
Fibre Ropes 448-450
Fibrous Plaster 383, 384
Fire Extinguishers ... 437-439
Fire Insurance 512-515

Page

Fire Place, Correct Design ... 175
Fire Resisting Doors 436
FIRST AID 539-541
Fixing Machines to Concrete ... 132
Flashing, Lead 410
Flat Roofs 124
Flexible Steel Wire Ropes ... 450-458
Floor Laying, Timber ... 106-111
,, Parquet 111
,, Polishing and Finishing 112-113
,, Sanding 111
,, Suspended 210-213
,, Tiles 459-461
Flooring, Costs Per Square 110, 111
,, Covering Capacity 107, 108
Flue Pipes Asbestos Cement 25-27
Flues, Invisible Gas Fire 374
Fluorescent Lighting 430
Flush Pipes 410
Fluxes for Soldering ... 334, 552
Fly Screen doors 136, 138
Footings, Brick 42
,, Stone 353
Foot, Lengths in Different Countries 548
Footpath Opening Charges ... 218
Footpaths 503
Formwork, Concrete ... 203-207
,, Contract Prices ... 85
,, R.S.J. Casings 214, 215
Foundations, Setting Out ... 3
Fractions and Decimals 544
Frames, Balance Hung 143
,, Box 140-142
,, Casements ... 144-146
,, Steel Window 326
Freights, Railway 167-169
French Polishing 360

G

Galvanized Corrugated Iron 387-391
,, Iron Downpipes ... 395
,, ,, Gutters ... 394
,, ,, Tanks ... 397-399
,, ,, Roofs ... 387-391
,, ,, Waterpipe 401-405
,, ,, Wire 505
Garage Doors 137, 140
,, Quantities and Cost 129-130
Gas Fitter 407
,, Hot Water Systems ... 424, 426
Gates, Tubular Steel ... 506, 507
Gauge Boxes, Concrete 185
Gauze, Bronze and Zinc ... 508, 509
Girder Testing 299
Glass Bevelling 291, 292
,, Bricks 285-288
,, Cutting 294
,, Drilling Holes 293
,, Lined Soil Pipes ... 408, 409
,, Louvres 130-131
,, Roofing Tiles... 443
,, Sheet and Plate ... 289, 290
,, Silvering 291
,, Weight of 294
Glazed Earthenware Pipes... 219-221
Glazier 289-296
Glued Laminated Timber ... 154, 155
Graders, Road 234-236
Gradients, Angles of Inclination ... 230
Granite 355, 356

Page

Gravel and Sand Weights ... 36
,, Specific Gravity 36
Grease Traps 220, 413
Grilles, Rolling 432
Grindstones 355
Griptiles 462
Gunite, Cement Gun ... 197-199
Gutters, Aluminium ... 395, 396
,, Asbestos Cement ... 21
,, Cast Iron 401
,, Copper 400
,, Galvanized Iron ... 394
,, Muntz Metal 400
Gyprock Plaster Board 90

H

Handrail, timber 152
Hardwood, Timber Costs ... 100
Hargans Mobile Saw 67
Heads, Rainwater 23
Heaters, Electric and Gas ... 422-427
Heating Systems 423-427
Heat Insulation 297
Hinges 509
Home Purchase Loans ... 519-511
Hooks, Pipe 422
Hoop Iron, Weight of 58
Hoppers, Slop 412
Horse Power of Streams 480
Hot Water Data 427
Hume Septic Tanks ... 467-471
"Hurlinge" Door and Window Hinge 509
Hydraulic Lifts 350
,, Rams 486
Hydraulics 480-487
Hygiea Dissolvenator 472

I

Immunising Timber Charges ... 99
Imported Water Pipe ... 405, 406
Increase in Volume, Materials ... 230
India Rubber 447, 448
Insect Pests in Timber ... 532, 533
Inspection Boxes 422
Insulating Cements ... 170-175
,, Materials ... 297,422
Insulation 297
Insurance 512-515
Iron and Steel Tests 298
Iron, Angle and Tee ... 310, 311
,, Galvanized Corrugated 387-391
,, Girder Testing 299
,, Hoop 58, 300
,, Round Bar 213
Ironmongery 508, 509

J

Joiner 136-153
,, Labour Constants ... 343, 344
Joint, Recipes for Iron ... 299, 305
Joists and Flooring Costs ... 109-111
,, Rolled Steel ... 308, 309, 313, 314
Junction Boxes 262

K

Kalsomine Covering Capacity ... 360
Kerb and Gutter 504
Kerosene Heaters 428, 429
Kitchen Chimney Cost ... 47, 48

Page

L

Labour Constants 341-347
Labour and Trade Proportions 346, 347
Ladders, Various 524
Laminated Timber 154, 155
Laminex 91
Land Clearing 68
Lathing 382, 383
Lattice 146
Lagging, Asbestos 422
Lead Dampcourse 61
,, Flashing 410
,, Gauge 545
,, Pipe 410
,, Sheet 61, 410
,, Traps 410, 411
Leaky Roofs, Repairs to 32
Letter Box, Terra-Cotta 54
Letters, Metal 331-333
Lifts and Escalators ... 348-352
Light, Electric 254
Lighting and Heating ... 423-429
,, Unit 282
Lime Whiting 363
Linings Wall 88-91
Link Rubber Matting 447
Lintels—and Beams, Concrete 213, 214
Lockers, Steel 337
Locks and Padlocks ... 508, 509
Logging-Timber 67-69
Louvres, Glass 130, 131
Lugsteel Brickwork Reinforcement 57
Lumber, Terra-cotta ... 373, 374

M

Machinery, Concrete ... 518-523
,, Woodworking ... 523
Magnesite Composition Flooring 33-34
Malleable Iron Pipes 404
Marble Mason 356
Masonite 88, 89
Masonry 353-356
Mastipave Floor Covering 33
Measurement of Quantities ... 2, 3
Mensuration of Surfaces and Volumes 550, 557
Metal Ceilings 330, 331
Metal and Sand 36
,, Lathing 383
,, Letters 331-333
,, Partitions 336
,, Shelving 336
,, Tiles, Roof 444, 445
,, Venetian Blinds 329
Metals, Melting Point of ... 128, 333
,, Weight of ... 128, 334, 536
,, Weights from Patterns 299, 334
Metal Windows and Doors... 326, 327
Metal Work 326-340
Method of Costing 4-6
Metric Equivalents—Steel Section ... 313
Mile, lengths in different Countries 549
Mixers, Concrete 518, 523
Mortar, Per Perch 353
,, Ready Mixed 54
Moisture Content, Timber... 99
Mouldings, Metal 28
,, Snap-on 335
,, Timber 147

Page

Mould, Treatment of 359
Muntz Metal, Downpipe and Gutter 400, 401
,, ,, Ridging and Valleys 401
,, ,, Weight of 335

N

Nails, Asbestos Cement 10
,, Number Per 7 lb. packet ... 107
,, ,, ,, ,, Square of Flooring ... 107
,, Roof—Number Per Square 394
Name Plates 331-333
Neon Lighting 430
Netting, Wire 506
"Nevertire" Water Pressure Unit 79
Newels and Balusters ... 150-152
Numbers, Squares and Cubes 557, 558
Nuts and Bolts, Weight of ... 302

O

"Oncost" Percentages 4, 5

P

Packing Charges for Joinery ... 138
Paint, Aluminium 358, 359
,, Covering Capacity 360
Painter 357-370
,, Labour Constants ... 344
,, Wall and Ceiling Tables 365-370
Paling Fences 127
Panhead Rivets, weight of ... 312
Paper, Building 297
,, Wall 371, 372
Paperhanger 371-372
Paperhanger's Tables 365-370, 372
Parquet Flooring 111
Partitions, Concrete Block... 373, 374
,, Steel 336
,, Terra-Cotta 373
Passenger Lifts 348-352
Patterns, Relative Weight of 299, 334
Pavements, and Roads ... 491-504
Pavings, Brick 41, 49
,, Cement 379
,, Terrazzo 34
Pavior—Contract Prices 85
Perimeters of Steel Rods 192
Perspex, Acrylic Sheet ... 294, 295
,, Corrugated Sheet... ... 296
Pests, Insect... ... ... 532, 533
Piers, Brick 47
Pile Driving 488-490
Piles Concrete 489, 490
,, Safe Load Formula ... 489, 490
,, Steel Sheet 490
,, Timber 488
Pipe Hooks 422
Pipes, Agricultural 224
,, Asbestos Flue ... 25-27
,, Bitulynd 404-405
,, Cast Iron 401-403
,, ,, ,, Soil ... 408, 409
,, Concrete 226-228
,, Copper 406, 407
,, Earthenware Glazed 219-221
,, Flush 410
,, Gas 407
,, Joint, Recipe for 305

	Page
Pipes Rainwater	401-403
,, Sizes for Water ...	... 480
,, Water and Steam ...	403-406
Plan Copying	... 507
Plant and Tools	518-524
Plaster, Covering Capacity...	377-378
,, Fibrous	383-384
Plasterer	375-383
,, Contract Prices ...	... 87
,, Labour Constants	... 345
,, Wall Tables ...	365-370
Plate Glass	... 290
Plugging	... 131
Plugs, Rawl	131-135
Plumber	387-422
Plumber Contract Prices ...	... 87
,, Labour Constants	341, 342
Plumbers, Soil Recipe ...	... 407
Plywoods	156-162
Pneumatic Tools and Machines	216, 217
Pointing, Brickwork ...	58, 59
,, Stonework ...	58, 59
Polishing, Floor	112, 113
,, French	... 360
Porcelain Enamel Panels	... 462
Portable Electric Tools ...	283, 284
Ports, Distances Between ...	... 167
Posts, Spacing Table ...	... 505
Precision Bricks	345, 346
Prefabricated Homes ...	... 135
Prepared Paints	363, 364
Preserving Timbers ...	66, 99, 533
Prismoidal Formula for Earthwork	229
Proportions, of Trades in Buildings	346
,, Labour and Materials	347
,, Right Angle Triangle	3
Pumps and Hydraulics ...	480-487
,, Installation in Wells	... 77
Purlins, Weight of Steel ...	... 319
,, Dimensions of Wood	... 319

Q

Quantities and Measurements	... 1-3
Quantity Surveyors Charges	... 516
Quantity Units for Measurement	... 2, 3
Quarry Crushers	240-242
Quarrying	239-243

R

Rafters, Lengths for Tiles	... 117
Railway Freights	167-169
,, Sleepers	... 70
Rainwater Heads, Asbestos	... 23
,, ,, Galvanized	... 395
,, Pipes	401-403
Ramp, Hardwood	... 126
Rams, Hydraulic	486, 487
Rawlplugs	131-135
Ready Mixed Concrete ...	202, 203
,, ,, Mortar ...	... 54
Recipe for Pipe Joint ...	... 305
Refractory Cements ...	170-173
Refrigeration	474-479
Reinforced Concrete ...	204-215
Reinforcement Bars ...	... 213
,, Fabric ...	208, 209
,, for Brickwork	... 57-58
Repairs to Roofs	... 32
"Reswood" Waterproof Plywood	161
"Rheem" Heating Systems	423-427
Ridging Copper and Muntz	... 401
Rise and Fall Adjustments	... 6

	Page
Rivets, Pan Head	... 312
Roads and Pavements ...	491-504
Roads, Bituminous Flush Seal	497-499
,, Concrete ...	183, 501-503
,, Earth	491, 492
,, Gravel	... 493
,, Macadam	499-501
,, Sand-clay ...	... 494
,, Stabilised	494-497
,, Metal Weights ...	... 36
,, Opening Charges ...	218, 219
Rolled Steel Joists	308, 309
,, ,, ,, Metric Sections	313
,, ,, ,, French	... 314
Roller Shutters and Grilles	431, 432
Roofing Constants Tables	... 117
,, Contract Prices ...	... 87
,, Costs—Timber ...	123-125
,, Framing Per Square	... 95
,, Weights	... 440
Roof Repairs	... 32
,, Tiler	440-446
Roofs, Asphalt	... 31
,, Bituminous Felt ...	31, 32
,, Cement Tiles ...	445, 446
,, Corrugated Iron ...	... 391
,, Flat Iron	... 394
,, Metal Tiles ...	444, 445
,, Setting out ...	118-122
,, Steel Square ...	... 122
,, Shingle	... 446
,, Terra-cotta	440-443
Ropes and Blocks ...	448-458
,, Breaking Strains ...	449-451
,, Weight of	449-451
Rough Cast on Asbestos Cement	... 9
Rubber Flooring and Tiles...	447, 448
Rubble Mason	... 353
Rust Joint for Iron ...	... 299
Rust, Removing from Iron	... 552

S

Sand and Metal	... 36
,, Cubic Feet to Ton ...	... 36
Sanding Floors	... 111
Sandstone Footings ...	... 353
,, Weight of ...	... 353
Sanitary Chemical System	... 472
,, Closet	... 471
,, Earthenware ...	411-414
Sanitation	463-473
Sash Balances	... 143
Sash Cords	... 508
Sashes, Timber	140, 146
Scaffolds, Tubular Steel ...	62-65
Scantlings to Superficial Tables	94-96
Scoops, Earth	... 238
Screens, Vibrating	... 243
Seasoning Charges of Timber	... 99
Semtex Mastic Tiles ...	... 447
Septic Tank, Cost of ...	... 467
,, ,, Plan ...	465-466
,, Tanks	463-471
,, ,, Table of Sizes	... 464
Setting out Foundations ...	... 3
,, ,, Roofs	118-122
Shaft and Well Sinking ...	76, 77
Sheave and Drum Diameters	455, 456
Sheet Lead Gauge	... 545
Shelving Steel	... 336
,, Timber	149, 150

	Page
Shingler	... 446
Shingles, Oak and Redwood	103, 446
Shop Awnings	319-324
Shop Fronts	152, 153
Shrinkage of Castings	... 334
,, ,, Concrete	... 190, 200
Shutters, Various	... 431, 432
Sieve Test of Aggregate	... 184, 185
Signwriting Costs	 362
Sills	... 140
Silos, Bushel Capacities of	... 82, 83
Silvering Glass ...	 291
Sinks, Earthenware ...	 472
,, Stainless Steel	... 327, 328
,, Porcelain Enamel	 415
Sisalkraft	 297
Skirting, Timber ...	 148
Skylights, Asbestos Cement	... 21
,, Corrugated Iron	... 392
Slates, Per Square	 443
Sleepers, Railway ...	 70
Sliding Doors ...	 433-435
Slop Hoppers ...	 412
Snowcem	... 380, 381
Soil Pipes, Cast Iron	... 408, 409
,, ,, Lead ...	 410
Soldering Aluminium	... 339, 340
Solder, Cost of ...	 411
,, Fluxes ...	 334
,, Recipe for	 334
Soot Proofing Chimneys	 40
Spacing Table, Pickets, etc.	97, 108
,, ,, Posts Per Mile	... 505
Specific Gravity of Metal	 36
,, ,, ,, Sand	 36
Squares of Numbers ...	 557
Spikes, Weight Per 1,000	... 299
Stainless Steel Armoured Plywood	162
Stainless Steel Sink Units	... 327, 328
Staircases, Timber ...	... 150-152
Stanley Gale Valve	 479
State Awards ...	... 537, 538
Steel Awnings ...	... 319-324
,, Bar Costs ...	 213
,, Casements ...	 326
,, Ceilings ...	... 330, 331
,, Econo	 325
,, Rods, Weight of	 193
,, Lockers ...	 337
,, Partitions ...	 336
,, Sashes and Frames	... 326
,, Sections ...	... 308-315
,, Shelving ...	 336
,, Square ...	 122
,, Stainless ...	... 327, 328
,, Test for ...	 298
,, Trusses ...	... 316-319
,, Windows ...	 326
,, Wire Ropes ...	... 449-458
Steps, Hardwood ...	 125
Stone Crushers ...	... 240-242
,, Weight of ...	 240
,, Work ...	... 353-356
Storage Water Heaters	... 423-427
Storey Rod for Brickwork	... 42
Stoves, Kerosene ...	... 428, 429
Structural Steel ...	... 313-325
Studs, Wall ...	... 114-116
Stump Caps ...	 47
Superficial Contents of Timber	93-96
Surveyor, Fees and Charges	... 515
Suspended Floors, Concrete	210-213

T

Tables, Spacing ...	97, 108, 505
,, Useful	542-560
Tanks, Capacity of	70, 73, 398
,, Contents Per Foot	... 548
,, Copper	... 400
,, Excavation for ...	... 230
,, Galvanized Iron ...	397-399
,, in Common Use ...	... 399
,, Septic	463-471
Tank Sinking ...	76, 77, 237, 238
Tar Concrete	... 30
,, Roads and Paths ...	... 30
Tarpaulins	 163
Tendering Methods ...	... 4-6
Tents and Flys	... 166
Termite Resistant Board ...	88, 89
Terra-cotta Fireplace ...	... 55
,, Lumber ...	373, 374
,, Roof Tiles ...	440, 446
,, Weight of ...	... 373
Terrazzo, Draining Boards	... 35
,, Pavings	... 34
Testing Charges, Materials	... 516
Tests, Girders	... 299
,, Iron and Steel ...	298, 552
,, Soundness of Logs	... 66
Tiler, Floor and Wall ...	459-462
,, Labour Constants ...	... 344
,, Roof	440-446
Tiles, Accessories	... 461
,, Asphalt	... 461
,, Cement Roof ...	445, 446
,, Glass Roofing ...	... 443
,, Griptiles	... 462
,, Metal Roof ...	444, 445
,, Number Per Sq. Yard	... 460
,, Roof, Number Per Square	... 440
Tilux Sheets	... 28
Timber Cartage Rates ...	98, 108
Timber Costs	100-106
,, Cutting	... 67
,, Densities	530, 531
,, Dressing Charges	... 99
,, For Building Purposes	525-531
,, Glued Laminated	154, 155
,, Haulage	68, 69
,, Hauling Machinery	... 69
,, Immumsation ...	... 99
,, Materials Per Square	... 98
,, Merchants Tables	93-96
,, Moisture Content ...	... 99
,, Preservation ...	... 66
,, Seasoning Charges	... 99
,, Tests	... 66
,, Weight of	... 536
Time Sheets	... 507
Tin, Cost of	... 411
Trachyte	... 356
Tractors	... 237
Transport Charges ...	167-169
Traps, Lead	410, 411
Travelling Cradle ...	... 65
Treatment of Insect Pests ...	532, 533
Trees, Choosing	... 66
,, Clearing Land ...	67-69
,, Destroying	... 66
,, to the Acre ...	... 67

Page

Trenches Excavation Table 222, 231, 232
Troughs, Concrete 78, 79
Truline Brick Machine 56
Trusses, Laminated Timber 154, 155
,, Steel 316-319
,, Weight Calculations 316-318
Tubes Copper 406
Tubs, Cement 415
Tubular Steel Scaffold ... 62-65
Tuckpointing 58, 59

U

Underpinning Buildings 552
Unifil Insulation 297
Urinal Stalls 413
Useful Cements 299
Useful Memoranda 552
,, Tables 542-560

V

Valley Gutter, Galv. Iron 391
Vandyke Prefabricated Homes ... 135
Vehicle entrances 219
Veneers, Plywood 159-162
Venetian Blinds, Metal 329
Vent-Axia Ventilation Unit 478, 479
Vent, Pipes, Galvanized 396
,, Stays 422
Ventilation 474-479
Ventilators, Asbestos Cement ... 10
,, Metal 328, 329
,, Roof 479
Verandah Blinds 164
Vocational Training Courses ... 511
Voids in Concrete 185

W

Wages and Awards ... 537, 538
Wall and Ceiling Tables ... 365-370
,, Boards 88-91
,, Coverings 115, 116
,, Facing 374
,, Framing—Timber ... 114, 115
,, Porcelain Enamel Panels ... 462
,, Studding—Timber ... 114, 115
,, Ties 47
,, Tiler 459-462
,, Waterproofing 359
Washers, Lead 411
Water Board Charges 517
,, Boring Plant ... 74-75
,, Drilling 74-75
,, Calculations 480
,, for Concrete... ... 186, 187
,, for Works 517
,, Data 398
,, —Gallons Per Minute Table 72
,, Heaters 422-427
,, Horse Power of Streams ... 480
,, Memoranda ... 70, 75, 481
,, Pipe Sizes 480
,, Pressure Tables 481
,, ,, Unit 79
,, Pumps 482-487
,, Required for Stock 71
,, Troughs 78, 79
,, Weight of 70, 481
,, Weights and Measures 70, 481
Waterproof Cements ... 170-175
Waterproofing Walls 359
Waxing Floors 112, 113
Weatherboards, per Square 115, 116

Page

Wedgeropes 38
Weight Cast Iron Columns Will Support 306
Weights and Measures Tables 542-560
Weight of Asbestos Cement 18, 26
Weight of Asbestos Cement—Corrugated 18
Weight of Asphalt 30
,, ,, Barbed Wire 505
,, ,, Bolts and Nuts ... 302
,, ,, Bricks 40
,, ,, Brick Walls 52
,, ,, Building Materials 534-536
,, ,, Castings from Pattern 299
,, ,, Cast Iron Pipes 300, 305
,, ,, Cast or Wrought Iron... 306
,, ,, Cement Blocks ... 374
,, ,, Concrete Columns ... 194
,, ,, Concrete Pipes 227, 228
,, ,, Corrugated Iron ... 387
,, ,, Drain Pipes ... 224, 225
,, ,, Earth and Rock ... 230
,, ,, Fencing Wire ... 505
,, ,, Fibre Ropes ... 449, 450
,, ,, Glass 294
,, ,, Hoop Iron 300
,, ,, Wrought Iron ... 306
,, ,, Metals ... 128, 334, 536
,, ,, Metals Table 307
,, ,, Muntz Metal ... 335
,, ,, Rivets 312
,, ,, Rods and Bars ... 193
,, ,, Rolled Steel Angles 310, 311
,, ,, ,, ,, Channels 309
,, ,, ,, ,, Joists 308, 309
,, ,, Round and Square Iron 303, 304
,, ,, Roof Coverings ... 319
,, ,, Sandstone 240
,, ,, Steel Bar 312
,, ,, ,, Girder Plates ... 309
,, ,, ,, Purlins 319
,, ,, ,, Trusses ... 316-319
,, ,, Timber 536
,, ,, Wire Ropes 451
Well Linings 76-78
,, Sinking 76-77
Wells, Pump Installations ... 77
Whitewash recipe 363
Winches, Logging 69
Windmills 483, 484
Windmill Lighting Plant 71
Windows, Aluminium 327
,, Steel 326
,, Timber 140, 146
Wire, Barbed 505
,, Fence, Ringlock 505
,, Fence, Weight Per Mile ... 505
,, Gates 506, 507
,, Gauge Numbers and Sizes ... 301
,, Netting 506
,, Ropes, Breaking Strain 451, 457
,, ,, Load Calculations 452, 453
,, ,, Weights ... 457, 458
Wire Worker 505-507
Wood Patterns 299
Wood Working Machine 523
Wrought Iron and Steel ... 298-312

Z

Zinc Fly Gauze 508
Zinc Spraying 326

INDEX TO TABLES

Page

A

Acre-Foot Content 552
Acre Measurement of Land ... 66
Acre, Number of Trees to ... 67
Air Pressure Table 479
Angle of Rest—Excavated Material 230
Angles of Inclination 230
Angles—Opening a 2 Foot Rule ... 153
Areas of Circles 553-556

B

Boards, Superficial Tables 93-96
Brickwork Bond Rod 41
Brickwork, Hours Per Rod Per 1000 42
British Weights and Measures ... 542
Building Loan Repayments ... 510
Buildings—Percentages of Trades 346
Buildings— ,, ,, Labour 347
Bushel Measure of Silos ... 82, 83

C

Capacities of Circular Tanks 70, 73, 548
,, ,, Corrugated Tanks ... 70
,, ,, Pipes and Casings ... 73
,, ,, Grain Silos ... 82, 83
,, ,, Round Vessels ... 73
Circumferences and Areas of Circles 553-556
Comparison of Solid Measurement 200
Constants of Labour ... 341-347
Contents in Gallons Table 548
Conversion Factors ... 546-548
Covering Power of Concrete or Mortar 200
Conversion Tables 545-548
Imperial to Metric 543, 545, 547
Metric to Imperial 543, 547
Cubes of Numbers 558
Cubic Yards in Trenches ... 231, 232

D

Decimal Equivalents of 64ths ... 549
Dimensions of Concrete Boxes ... 185
Distances Between Ports ... 167

E

Equal Circles and Squares ... 517

F

Fractions and Decimal Equivalents 544
Foundations—Cubic Yards in Trenches ... 222, 231, 232

G

Gradients—Rise Per Mile 230

H

Homes Purchase Loans Table ... 510

I

Inches as Decimals of one Foot ... 559
Inches Converted to Millimetres ... 545

Page

J

Joists—Rolled Steel Weights 308, 309

L

Labour Adjustment Table ... 5
Lead Sheet Gauge 545
Length of foot in various countries 548
,, ,, mile ,, ,, ,, 549
Lineal Measure 542
Liquid Measure 542

M

Measures and Square Dimensions... 542
Measure of Surfaces and Volumes 550-551
Metric Equivalents of Steel Sections 544
Metric Measures and Weights ... 549

N

Nails—Number Per Pound ... 107
,, — ,, ,, 7 lb. Packet ... 107

P

Paperhangers Tables 365-370, 372
Proportions of Trades in Buildings 346
Proportions of Labour in Buildings 347

R

Ready Reckoner 560
Right Angle Triangle Proportions... 3
Ropes—Weights and Breaking Strains 449-451

S

Septic Tank Sizes 464
Sheet Lead Gauge 545
Solid Measure 52, 546
Spacing Tables, Pickets, Battens 97, 108
,, ,, Fence Posts Per Mile 505
Squares of Numbers 557
Square Measure 50
Storey Rod for Brickwork ... 42

T

Timber Merchants Tables 93-96
Trench Excavation Tables 222, 231, 232
Troy Weight 542

W

Wall Surface in Rooms Tables ... 372
Water Weights and Measures ... 481
,, Pressure at Various Heads... 481
Weights and Measures ... 542-560
Avoirdupois Weight 542
Coin Weights and Measures ... 517
Troy Weight 542
Lineal Measure 542
Liquid Measure 542
Square Measure 542
Weight of Building Materials 534-536
,, ,, Earth and Rock ... 230
,, ,, Metals Table 307
Wire Fence, Weight Per Mile ... 505

Index to Advertisers

	Page
Wunderlich Ltd.	Inside Front Cover
Econo-Steel Co.	1
Masonite Corporation (Aust.) Ltd.	2
Contract Reporter, N.S.W.	3
Slade, Allan and Co. Pty Ltd.	4
Slade, Allan and Co. Pty Ltd.	5
Aladdin Industries Pty Ltd.	6
Aladdin Industries Pty Ltd.	7
Pabco Products Pty Ltd.	8
Waygood Lifts Ltd.	9
Humes Ltd.	10
Armstrong-Holland Pty Ltd.	11
R. Fowler Ltd.	12
F. W. Williams and Co. Pty Ltd.	13
James Hardie and Co. Pty Ltd.	14
Black and Decker (Australasia) Pty Ltd.	15
Otis Elevator Co. Pty Ltd.	16
Dux Heaters Pty Ltd.	17
Australian Window Glass Pty Ltd.	18
Cement and Concrete Association of Australia	19
A.R.C. Engineering Co. Pty Ltd.	20
The Cement Marketing Company (Aust) Pty Ltd.	21
Sani-lid Chemical Co.	22
Quirk's Victory Light Co.	23
Ready Mixed Concrete (N.S.W.) Pty Ltd.	24
Wesco (Australia) Pty Ltd.	25
Australian Aluminium Co. Pty Ltd.	26
York Air Conditioning Refrigeration (Aust.) Pty Ltd.	27
Terazzo and Co. Pty Ltd.	28
Fibrous Plaster Association of N.S.W.	29
Watson and Crane Pty Ltd.	30
The Trussed Concrete Steel Coy. (Aust.) Pty Ltd.	31
Arthur H. Dillon Pty Ltd.	32
Master Builders' Insurance Co. Ltd.	33
Building Publishing Co. Pty Ltd.	34
G. A. Bradford and Co. Pty Ltd.	35
Wunderlich Ltd.	35
Loveridge and Hudson Pty Ltd.	36
Gamble and Dreelin Pty Ltd.	36
Neuchatel Asphalte Co. (Australasia) Pty Ltd.	37
Blue Metal and Gravel Pty Ltd.	37
Dunlop Rubber Australia Ltd.	38
Keppie MacMahon and Co.	38
Sydney College of Engineering and Architecture	39
Meggitt Ltd.	39
Pipe Linings Australia Pty Ltd.	40
Griptile Pty Ltd.	40
Colonial Sugar Refining Co. Ltd.	41
Hallstroms Pty Ltd.	41
Nonporite Pty Ltd.	42
Redondo Tile Company (Aust.)	42
Sterling Paint and Varnish Co. Pty Ltd.	43
Zions Industrial Arbitration Act Time Sheet Offices	43
John Lysaght (Australia) Pty Ltd.	44
Cement Gun Pty Ltd.	44
Hygiea Sanitary Co. Pty Ltd.	45
Robert Douglas Pty Ltd.	45
Consolidated Porcelain Enamels Pty Ltd.	46
The Australian Wire Rope Works Pty Ltd.	46
Smith Copeland and Co. Pty Ltd.	47
Oliver Britstand Distributors	48
Oliver Britstand Distributors	49
Ralph Symonds Ltd.	50
Truline Brick Machine Co.	51
International Correspondence Schools Australasia Pty Ltd.	52
John Lysaght (Australia) Pty Ltd.	53
N.C.L. Engineering Co. Pty Ltd.	54
Manufacturers Special Products Pty. Ltd.	55
McPhersons Ltd.	56
G. E. Crane and Sons Ltd.	57
Dangar, Gedye and Malloch Ltd.	58
Dangar, Gedye and Malloch Ltd.	59
Anthony Hordern and Sons Ltd.	60
Rheem Australia Pty Ltd.	61
Hadfields Steel Works Ltd.	62
H. E. Garraway	63
Moulded Products (A'sia) Ltd.	64
Bernard-Smith (Pty) Ltd.	65
The Newman-Underwood Tile Co. Pty Ltd.	66
Armco (Australia) Pty Ltd.	67
Steelbilt Ltd.	68
Wormald Bros. Industries Limited	69
Imperial Chemical Industries of Aust. and N.Z. Ltd.	70
Hawkesbury Sandstone Pty Ltd.	71
John Danks and Son Pty Ltd.	72
F. W. Gissing Pty Ltd.	73
Claude Neon Limited	74
The Sydney Steel Co. Pty Ltd.	75
Emm. Yannoulatos (Overseas) Pty Ltd.	76
Emm. Yannoulatos (Overseas) Pty Ltd.	77
J. Murray Steel Works Pty Ltd.	78
Jenson and Nicholson (Aust.) Pty Ltd.	79
H. and E. Sidgreaves Pty Ltd.	80
Precision Brick Pty Ltd.	81
John Danks and Son Pty Ltd.	82
Vandyke Brothers Pty Ltd.	83
H. McKenzie Ltd.	84
Cable Makers Australia Pty Ltd.	Inside Back Cover.
Malleys Ltd.	Outside Back Cover.

THE

AUSTRALIAN

Architects, Builders and Contractors' Price Book and Guide

(REVISED 11TH EDITION)

COMPLETE WITH PRICES, TABLES, WEIGHTS OF MATERIALS, ETC.

QUANTITIES AND MEASUREMENTS.

Adhere as much as possible to the order pursued by the builder &c., in actual construction.

In taking dimensions, it will be found most convenient to work from left to right. In unusual designs, make sketch plans with dimensions.

In excavations, foundations, or walls of a building, take the back and front and parallel walls from out to out, and the other walls in the clear.

In scaling from a plan, when the dimensions are not given, apply the reading of the scale at the end of the first dimension to the commencement of the second dimension; repeating the operation until the scale is exhausted or the end of the scale is reached; note these accumulated dimensions, and repeat the process until the whole of the sizes required are measured.

Chimney breasts, including fireplaces, are generally reckoned solid, allow for arch separately when the fireplace opening is deducted. **Chimney breasts or flues** are not deducted in measuring ceilings.

Ovens, coppers and furnaces are reckoned solid by the cube yard.

Facings, pointing, etc., by the yard super or square of 100 sup. feet.

Gauged arches, cuttings, etc., by the foot super.

Openings.—The width is always given first and then the height; **daylight**, or the size of opening in wall being included.

If the head is curved, the height from the stone or brick sill to the centre of soffit implied, unless stated otherwise.

QUANTITY UNITS FOR MEASUREMENTS

Excavator.

Clear site	Item
Surface Excavation	Item stating depths
Trenches	Cubic yards stating depths
Rock	Cubic Yards
Rock Scabbling	Super feet
Filling	Cubic Yards stating type

Concretor

Footings	Cubic Yards
Paths, floors	Super yards state thickness

Formwork

Squares super	(Nett surface)
Reinforcing rods	Cwts, quarters, pounds
,, fabric	Super yards

Drainer

Drain pipes	Lineal feet
Fittings	Number
Connecting wastes	Number
Pierce Kerb	Number
Sullage Trench	Number

Pavior

Rendered surface	Super yards state thickness
Rounding	Lineal feet

Wall and Floor Tiler

Wall and floor tiles	Super yards
Round edge tiles	Lineal feet
Strips, capping tiles	Lineal feet

Terrazzo

Floors	Super yards
Rounding	Lineal feet
Partition Walls	Super feet
Piercing, etc.	Number

Bricklayer

Brickwork	Rods or Number
Brick on edge	Super Yards
Face bricks	Super yards extra only over common bricks
Hacking walls	Super yards
Dampcourse	Super feet
Lead Dampcourse	Cwts, quarters, pounds

Rubble Mason

Rubble Stone	Super perch up to 18in. thick Cubic perch over 18in. thick
Copings, rebates	Lineal feet

Stonemason

Dimension stone	Cubic feet for over 12in. on all sides or super feet for under 12in.
Moulded work	Lineal feet
Stone Paving	Super yard

Steelwork

Cwts, quarters, pounds

Ironworker

Metal windows	Super feet
Balustrade	Lineal feet
Gates	Number
Arch bars	Cwts, quarters, pounds
Bolts, nuts	Cwts, quarters, pounds

Carpenter

Timber Generally	Super foot (reduced)
Flooring	Squares super
Asbestos Cement	Super Yards
Cover strips, angles	Lineal feet
Wall boards	Super feet
Fencing	Lineal Feet

QUANTITY UNITS FOR MEASUREMENTS

Joiner

Timbers generally, Mouldings, etc.	Lineal feet
Windows	Number
Doors	Number
Wall panelling	Super feet
Hinges, locks, etc.	Number

Roofer

Tiles	Squares Super
Ridging	Lineal Feet
Apex and Starters	Number
Pointing	Lineal foot
Asbestos Cement	Similar to tiles
Cutting and waste	Lineal feet
Ventilators	Number
Corrugated iron	Similar to above

Plumber and Gasfitter

Pipes generally	Lineal foot
Fittings	Number
Connections	Number

Electrician

Conduit wiring, etc.	Lineal feet
Fittings	Number

Painter

Walls, etc.	Super yard
Dado lines, etc.	Lineal foot
Roof painting	Square super

Plasterer

Walls	Super yard state thickness.
Rounding, moulding	Lineal feet extra only

Glazier

Clear glass, etc.	Super foot

Openings in Brickwork under 10 super feet included in measurement.

Painter walls etc., openings under 10 super feet included in measurement.

Plaster walls, openings under 20 super feet included in measurement.

METHOD OF SETTING OUT FOUNDATIONS.

To set out foundations and footings of buildings it is advisable to make a square of battens to obtain a right angle. This is done by nailing the square ends of two battens together at approximately right angles. Measure along one batten a 6 ft. mark and along the other batten an 8 ft. mark. Join these two marks with a brace batten marked accurately 10 ft. The marks on the battens must intersect accurately with each other to form a right angle. The result is a triangle of battens. Lengths 3 ft., 4 ft., and 5 ft. and all multiples of these numbers may be used. The larger the numbers used the greater the accuracy obtained.

VARIOUS PROPORTIONS OF RIGHT ANGLE TRIANGLES.

Side	3	5	7	8	9	11	12	13
Side	4	12	24	15	40	60	35	84
Hypotenuse	5	13	25	17	41	61	37	85

COSTING AND TENDERING

The costing of buildings and other constructional work to obtain a TENDER PRICE, usually comprises the following items of cost :—

1. Nett Cost of Work.
   Includes materials, labour and minimum cartage.
2. Additional Cartage and Handling Charges.
3. Scaffolding and Rigging Charges.
4. " On Cost " Charges
5. Profit.

THE COSTS IN THIS BOOK ARE NETT COSTS OF WORK, to which must be added the other items of expenditure to obtain a TENDER PRICE.

Cartage and Transport.

A minimum cartage rate on materials has been included in examples of cost as a reminder to tenderers to add extra mileage and packing charges where necessary. Cartage, mileage rates and packing charges are given to adjust this item of cost where necessary.

Scaffolding and Rigging.

Scaffolding costs are shown under SCAFFOLDING and must be added where applicable.

" On Costs."

ONCOSTS usually comprise the costs and charges shown below, and it has become the practice to add them directly to the LABOUR COSTS as a percentage of the labour costs.

Approximate " ON COST " percentages added to LABOUR COSTS.

1. Establishment Charges :—General Foreman, Joiner's Shop, Plant Hire or Payment, Transport Of Sheds, etc.	10%
2. Preliminary Charges :—Office Expenses, Salaries, Cars, Trucks, Plant Depreciation, Phone, Rent, Stationery, etc.	5% to 10%
3. Workmen's Compensation Insurance	5%
4. Public Risk and Fire Insurance	5%
5. Pay Roll Tax	2½%
6. Fares and Travelling Time	5% to 10%
7. Sick Leave	2%
8. Annual Leave	4%
9. Public Holiday Pay	4%
10. Incidental Expenses to be Assessed and Added	

It will be seen that some of the " ON COST " percentages mentioned above do not apply for every job and contractors must assess their own " ON COST " percentages. The above percentages are given as a guide only. On direct sub-contracts it is only usual to add a small " ON COST " to cover supervision. On extensive constructional jobs, public works, factories, industrial buildings, the following " ON COST " percentages are accepted average percentages for the various trades.

Excavator	45%	Drainer	45%
Bricklayer	50%	Concretor	50%
Pavior	50%	Carpenter and Joiner ...	45%
Plumber and Gasfitter ...	48%	Roof Tiler	45%
Electrician	45%	Plasterer	44%
Painter	50%	Glazier	45%

Profit.

The usual PROFIT of 10% is added to the total of previous costs to complete the TENDER PRICE.

Basic Wage Adjustments to Labour Costs.

The costs in this book are based on a basic wage rate of £9 0s. 0d. for a 40 hour week.

For every 1/- rise in the basic wage, tradesmen's wages increase by 1/- per week. Thus a wage of £10 per week would increase to £10 1s. 0d. This represents .5% increase in labour costs for every 1/- rise in the basic wage.

Labour costs may be adjusted on examples of costs given in book or by taking an average job as 60% labour and 40% materials and adding .5% to the labour costs for each shilling rise in the basic wage. This .5% holds good for any proportions of labour and materials, but, being based on £10 per week wage would tend to become less on an increased wage and slightly more on a lesser wage than £10 per week.

Table of Labour Adjustments.

Based on £10 per Weekly Wage.

Labour Cost	Basic Wage Rise				
	1/– rise	2/– rise	3/– rise	4/– rise	5/– rise
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1 0 0	1 0 1½	1 0 2½	1 0 4	1 0 5	1 0 7
5 0 0	5 0 6	5 1 0	5 1 6	5 2 0	5 2 6
10 0 0	10 1 0	10 2 0	10 3 0	10 4 0	10 5 0
50 0 0	50 5 0	50 10 0	50 15 0	51 0 0	51 5 0
100 0 0	100 10 0	101 0 0	101 10 0	102 0 0	102 10 0
200 0 0	201 0 0	202 0 0	203 0 0	204 0 0	205 0 0
500 0 0	502 10 0	505 0 0	507 10 0	510 0 0	512 10 0
1,000 0 0	1005 0 0	1010 0 0	1015 0 0	1020 0 0	1025 0 0

Rise and Fall Adjustments.

Where a rise and fall clause is inserted in a contract, the adjustments are made from time to time as changes occur in the prices of labour and materials and will normally not include amounts paid as progress payments previous to the change in prices. *Example*:—In a £5,000 job where progress payments have been made of say £2,000 and £1,000 previous to a rise in materials or basic wage, then the adjustment is usually made only on the outstanding balance of £2,000 to complete the job. The value of increased wages can be assessed from this amount, but increased or decreased material costs need to be calculated at their nett cost at the actual time, in conjunction with the amount of materials necessary to finish the job.

Cottages—Approximate Cost per Square.

1951.

To reduce the cost of a cottage to an amount per square (100 sq. feet) of floor space is, of course, only a rough check on tendering price. Much depends on the quantity and type of foundations, retaining walls, transport of materials, standard of fittings and finish of cottage.

The figures given below are the nett costs of an average or standard home and the builder must judge for himself what extra work is involved. The only safe method of tendering is the measurement of quantities and pricing accordingly.

Approximate Nett Cost per Square—1951.

Average or Standard Home.

Brick £300 : Brick Veneer £260 : Asbestos Cement £230.

Contractor to Add Incidental Costs and Profit.

ASBESTOS CEMENT BUILDING MATERIALS.

Asbestos Cement Materials are manufactured from asbestos fibre and portland cement, moulded into various building materials such as wall and ceiling sheets, corrugated roof sheets, mouldings, ventilator, flue and down pipes, guttering, rainwater heads, ventilators, etc. All necessary accessories, cover mould, angle mould, horizontal mould, are manufactured to make a complete and satisfactory job in asbestos cement. Asbestos cement is weather proof, rust proof, white ant and borer proof, rodent proof, fire retardent, impervious to sea air, unaffected by dampness and durable.

The distinctive appearance gained by laying the wall sheets horizontally with horizontal cover mould, combined with the judicious use of curved corners, make the modern asbestos cement home compare favourably with more costly types of dwellings. The walls can be coloured to suit individual tastes.

Directions For Fixing Flat Sheets.

Framework should be of the same dimensions as generally used for frame construction. Studs and joists should be of even depth so as to form a flat surface, and spaced according to the width of the sheets to be used, viz. :—
Sheets 4ft. wide, 2ft. or 16in. centres—Sheets 3ft. wide at 18in. centres.

Stacking.

Asbestos sheets should be stacked on an even surface and kept under cover. If left out in the weather, weights should be placed on top of stack.

Cutting.

Sheets may be cut with a hand saw, or by scribing deeply with the sharp end of a chisel or old knife along a straight edge, when they can be snapped apart. Asbestos cement cutters are manufactured.

Fixing.

Sheets should be nailed, approximately 9in. apart and 3/8in. from edge, with special blunt point sheet nails.

EXTERIOR WALL TREATMENT.

Flashing of Horizontal Joints.

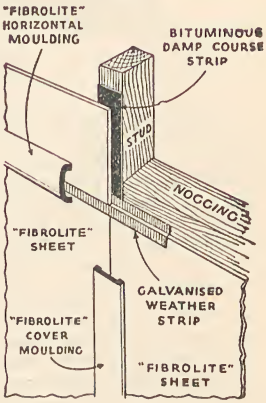
External horizontal joints must be flashed as shown below with galvanized weather strip before fixing top sheets.

Horizontal Treatment.

Select sheets of such length as will ensure the elimination of as many vertical joints as possible, consistent with symmetrical panelling.

The horizontal joints are covered with Asbestos Cement Horizontal Moulding, vertical joints with Asbestos Cement Cover Moulding and corners with Asbestos Cement Angle Mouldings.

Vertical Treatment.



Sheets should be purchased in lengths to suit the full height of the wall. Cover all joints with cover moulding and corners with angle mouldings. The use of bituminous felt dampcourse on face of studs, as shown, is recommended.

Base of sheets around entire area of building should be covered with cover moulding or horizontal moulding, and intersection of wall sheets and eaves lining with angle moulding.

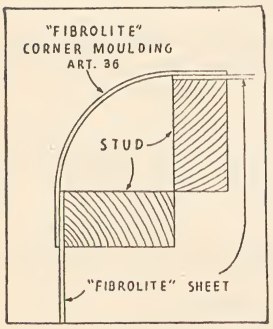
CURVED CORNERS.

Curved Asbestos Cement Sheets, with mouldings to suit, are manufactured in the following radii :—

1ft., 1ft. 6in., 2ft., 3ft., and 4ft. for exterior walls.

8in., 1ft. 2in., 1ft. 8in., 2ft. 8in., and 3ft. 8in. for interior walls.

All curved sheets and mouldings are specially manufactured to order. The use of curved corner moulding provides an effective method of giving a rounded corner effect without sacrificing space in the interior of the building. These corner mouldings are applied as shown in Fig. and a special curved piece of horizontal moulding is used to carry the horizontal motif around the building without interruption.



PAINTING.

Before applying paint to sheets, see that the surface is thoroughly dry.

Cold Water Paint is recommended for both exterior and interior surfaces, giving satisfactory results at the minimum of cost.

Oil paints and enamels may also be used on Asbestos Cement. Before applying these mediums, the sheets must be given a priming coat with a cement sealer.

APPLYING WALLPAPER.

Before applying wallpaper the surface of the sheets should be given a coat of wall size.

All joints should be stopped with plaster and covered with strips of cheese cloth about 2in. wide. The whole surface is then covered with a lining paper, after which the wallpaper is applied in the usual way. When wallpaper is to be applied vertically, the lining paper should be applied horizontally, and vice-versa.

APPLYING ROUGHCAST OR "STUCCO" TO SHEETS.

1. First apply a narrow strip of waterproof building paper to the face of all studs on which sheets will butt, to prevent timber from absorbing water from cement aggregate.

2. Erect sheets with reverse side exposed and joints butted.

3. Cover all joints, both vertical and horizontal, with a 3in. wide strip of ½in. or ¾in. mesh wire netting.

4. Thoroughly saturate sheets with water after erection.

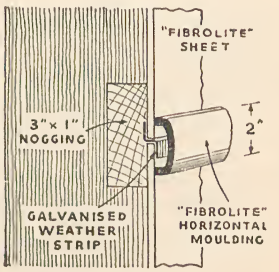
5. Paint exposed surface of sheets with one good coat of neat cement and water of creamy consistency.

6. After thoroughly mixing the roughcast, composed of two parts of cement, 1 part of clean sand, and 4 parts of coke breeze (by measure) apply in the usual way. After applying roughcast, keep moist for a few days.

Another Method: Fix sheets reverse side out, butt all joints and cover the whole area with ½in. mesh bird wire, stretched taut and securely tacked down. Dampen sheets, give one coat neat cement and water, and then apply roughcast in the usual way. Roughcast should not be applied until all heavy nailing in building has been completed.

WALL FIXING.

External Walls: Studs should be 4in. x 2in. checked into top and bottom plates, braced with 3in. x 1in. battens let in flush with studs. Noggings should be 4in. x 2in. cut in between studs to take horizontal joints of sheets. Where walls are not lined internally a 3in. x 1in. nogging may be used on external walls as shown in sketch. Galvanized iron weather strips to be inserted at all horizontal joints and covered, if desired, with horizontal cover mould. A special cover mould is made for covering a joint between Asbestos Cement sheets and weatherboards.



METHOD OF COSTING.

The examples of costs are calculated at the basic cost rate with the current surcharge shown separately. Thus any change in prices is quickly adjusted by altering the percentage surcharge only. Basic cost 3/16in. sheets 2/4½ per sq. yd., plus 50% surcharge 3/7 per sq. yd.

CARTAGE RATES.

The above cost of wall sheets includes delivery F.O.B. or F.O.R. Sydney, and also to areas bounded by the following suburbs :—Mona Vale, Quaker's Hill, Mt. Kuring-gai, Engadine, Rooty Hill and Ingleburn.

Add 1d. per sq. yard for delivery by road to areas as follows :—

Beyond Mona Vale to Avalon, Bay View and Church Point, Mt. Kuring-gai to Cowan, Quaker's Hill to Riverstone, Rooty Hill to St. Marys, Ingleburn to Campbelltown, Engadine to Waterfall.

Add 2d. per sq. yard beyond Avalon to Palm Beach, Cowan to Hawkesbury River Station or Peats Ferry, Riverstone to Richmond, St. Marys to Emu Plains, Crossroads to Camden, Waterfall to Helensburgh.

Beyond above areas, in accordance with cost. Minimum, 16/8 per 100 sq. yards.

Where crating of sheets is required, an extra nett charge is made at cost of crating.

Crates are not returnable.

For purposes of costing the above cartage rate is reduced to an approximate mileage rate.

20 miles cartage—Free delivery.
25 ,, ,, Add 1d. per sq. yd. = 1/- per square.
30 ,, ,, Add 2d. per sq. yd. = 2/- per square.

ACCESSORIES.

Mouldings—Stock lengths 6ft., 7ft., 8ft., 9ft. and 10ft.—Per 100ft. lineal.

Type	Basic Cost	Plus 50% Surcharge £ s. d.
Cover Mould 1½in.	11/-	16 6
Cover Mould 2in.	12/6	18 9
Horizontal Mld. 2in.	21/-	1 11 6
Internal Angle Mld.	23/-	1 14 6
External Angle Mld.	23/-	1 14 6

Galv. Iron Dripstrip—6ft. length 1/- = 2d. per foot.

Ventilators 9 x 6 Interior 11/6 per doz. plus 50% surch. 17/3 doz.

Ventilators 9 x 6 Exterior (louvre) 12/6 per doz. plus 50% surch. 18/9 doz.

Nails—Blunt Galvanized 1in., 1¼in., 1½in. x 14 Gauge—1/2 per lb.

The following examples of cost show the cost of supplying and fixing asbestos cement sheets **without studding.** Where it is desirous to include studding per square in one operation, these costs are shown in " carpenter."

Example of Cost No. 1—External Walls—Per Square.

Costs do not include angle mould	£	s.	d.
12 sq. yds. $\frac{3}{16}$in. Asbestos Cement Sheets @ 2/4½	1	8	6
Add 50% surcharge		14	3
Labour Cutting and Fixing Sheets 4 hrs. @ 6/–	1	4	0
20ft. Horizontal Mld. including 50% Sc. @ 31/6		6	4
10ft. Cover Mould including 50% Sc. @ 18/9		1	11
20ft. Galv. Iron Dripstrip Fixed @ 3d.		5	0
Fixing 30ft. Moulding @ 3d.		7	6
Add Nails		1	0
Cost = 8/– per sq. yard Nett Cost Per Square =	£4	8	6

Add External Angle Mould 10d. per foot Fixed.

Add Scaffolding, Extra Cartage, " On Costs " and Profit.

Example of Cost No. 2—Internal Walls—Per Square.

One side only sheeted and panelled with cover strips. Angle mould not included—	£	s.	d.
12 sq. yds. $\frac{3}{16}$in. Sheets @ 2/4½ per sq. yd.	1	8	6
Add 50% surcharge.		14	3
Labour Cutting and Fixing Sheets 4 hrs. @ 6/–	1	4	0
40ft. 2in. Cover Mould including 50% surcharge @ 18/9		7	6
Fixing 40ft. Moulding @ 3d. per ft.		10	0
Nails		1	0
Cost = 7/8 per sq. yd. Nett Cost Per Square =	£4	5	3

Add Angle Mould 10d. per ft.—Ventilators and Trimming 3/6 ea. fixed.
Add Scaffold, " On Costs ", Cartage beyond 20 miles and Profit.

Example of Cost No. 3—Internal Walls.

Both Sides of Walls Sheeted and Panelled £8 10 6 per square.

Example of Cost No. 4—External Walls.

Sheeted Externally and Internally as Above £8 13 9 per square.

CEILINGS.

Example of Cost No. 7—Per Square.

Angle mould not included	£	s.	d.
12 sq. yds. $\frac{3}{16}$in. Sheets @ 2/4½ per sq. yd.	1	8	6
Add 50% Surcharge.		14	3
Labour Cutting and Fixing, 5 hrs @ 6/–	1	10	0
40ft. Cover Mould including surcharge @ 18/9		7	6
Fixing 40ft. Mould @ 4d. per ft.		13	4
Scaffold and Nails.		3	6
Cost = 8/6 per sq. yard (Ceilings) Nett Cost per Square =	£4	17	1

Add Angle Mould if required @ 10d. per foot Fixed.

Add " On Costs," additional Cartage and Profit.

Example of Cost.

	£	s.	d.
For room say 14ft. x 12ft. with Cornice Angle Mould = 168 sq. feet.			
1.68 squares at £4 17 1	8	3	0
Cornice—52ft. Angle Mould @ 10d. per foot	2	3	4
Nett Cost of Ceiling 14ft. x 12ft.	£10	6	4

ROOFING.

Corrugated Asbestos Cement Sheets are manufactured in two pitches. The " pitch " is the distance, centre to centre, of one corrugation. The large corrugated sheet, better known by the registered trade names of " Super-Six " and " Deep-six," has a pitch of 5¾ inches and is used in large constructions, factories, theatres, garages, etc.

These sheets may be fixed with a 2in. or 7in. lap and not less than a 7in. end lap with a roof pitch of 20 degrees.

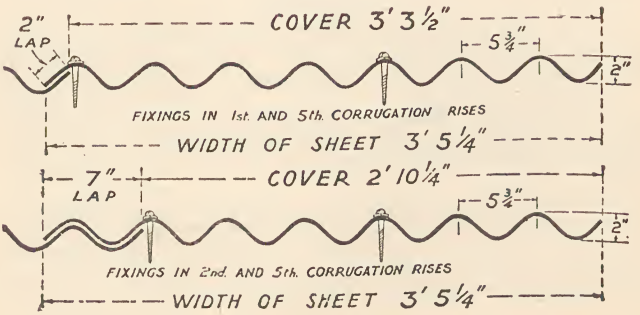
Increase end lap if roof pitch is lower than 20°. The side lap of 7in. is used when dust or grit is to be excluded from building or when exposed to severe weather conditions. The side and end laps may be sealed—by means of a plastic bituminous compound.

The small (standard) corrugated sheet has a pitch of 3in. and is suitable for home building and other small constructions. Fix with a 3in. side lap and not less than 6in. end lap with a roof pitch of 20 degrees. When the roof pitch is less than 20 degrees increase the end lap accordingly.

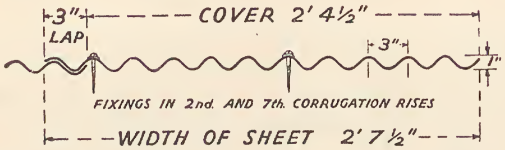
Stock lengths of sheets 4ft. to 10ft. with 6in. increases in length.

METHOD OF FIXING.

Large 5¾in. pitch corrugated sheets—showing lap and position of screws: The holes should be drilled $\frac{1}{32}$in. greater than the screw or bolt to be used.



Small 3in. pitch corrugated sheets—Holes to be drilled, not punched.



Generally: Fix sheets so that the lap is away from the prevailing weather. The screws or bolts must be dipped in plastic bitumen to "seal" the hole in the sheet. When using 2 piece Fluted Ridge Capping, both sides of roof must begin from the same end.

Cut off the first whole corrugation of the two piece fluted ridge capping to start.

Always use roof planks to walk upon.

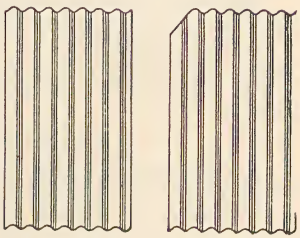
METHOD OF MAKING A MITRE CUT.

The mitre cut on roof sheets differs with "left to right" and "right to left" fixing.

"Left to Right" Fixing.

Left hand corrugation turned down. **Bottom course**: Starting sheet not to be cut. Fig. 1. All other sheets to be mitre cut at the top left hand corner only. Fig. 2.

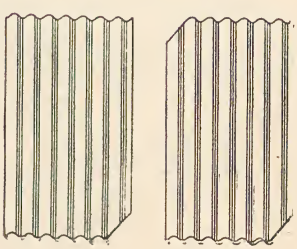
Fig. 1. Fig. 2.



Intermediate courses: Starting sheet mitre cut at bottom right hand corner only. Fig. 3. Right hand finishing sheet mitre cut at top left hand corner only. Fig. 2. All other sheets mitre cut at left hand top and right hand bottom only. Fig. 4.

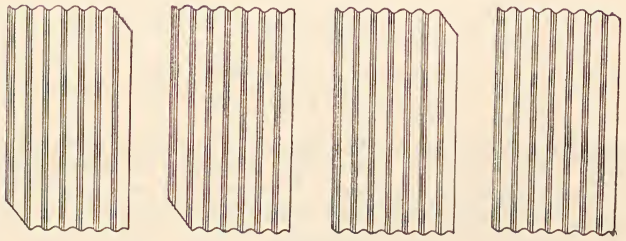
Top course: Right hand finishing sheet laid without cutting. Fig. 1. All other sheets mitre cut at bottom right hand corner only. Fig. 3.

Fig. 3. Fig. 4.



" Right to left " Fixing.
Right hand corrugation turned down.

Fig. 5. Fig. 6. Fig. 7. Fig. 8.



Bottom course: Starting sheet not cut. Fig. 8. Other sheets mitre cut right hand top corner. Fig. 7.

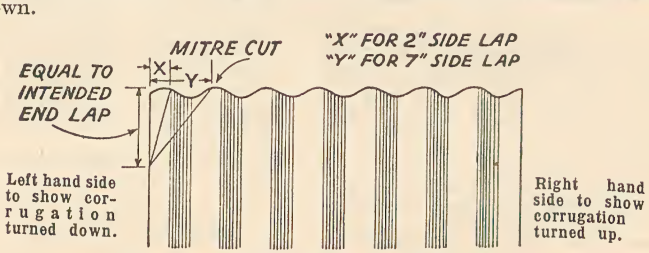
Intermediate course: Starting sheet mitre cut left hand bottom corner only. Fig. 6. Other sheets mitre cut at right hand top and left hand bottom corners. Fig. 5.

Top course: Left hand finishing sheet not cut. Fig. 8. All other sheets mitre cut at left hand bottom only. Fig. 6.

The mitre cut is in all cases equal to the end lap along side of sheet and equal to the side lap along edge of sheet.

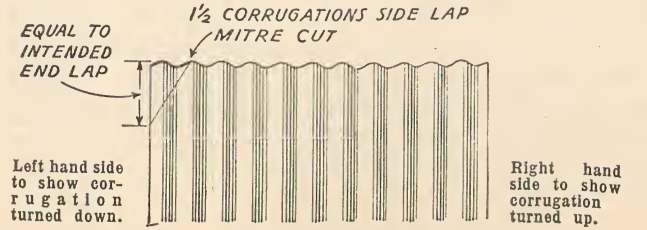
Large " Super-Six " or " Deep-Six " corrugated sheets: Sketch shows " left to right " fixing.

Reverse cut for " right to left " with right corrugation turned down.

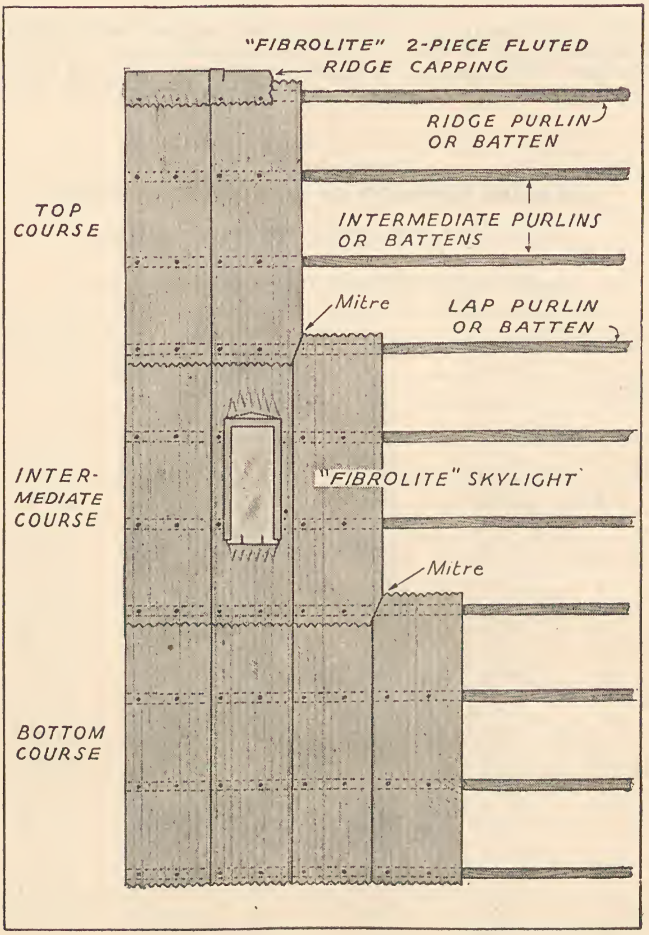


Small corrugated " Standard " sheets: Sketch shows " left to right " fixing.

Reverse cut for " right to left " with right corrugation turned down.



Roof—Showing Mitre Cut and Finish.



A template should be made by laying one sheet on another with the side and end laps correct and cutting with a saw through intersection. Both ends of sheet may be cut and this sheet used as a template for all others.

For all fixing, curved galvanized iron washers and bituminous felt washers must be used. Do not screw too tightly. To fix two-piece fluted ridging to deep corrugated sheets, a special mitre cut must be made on overlapping top sheets to fit the splayed edge of the ridging.

COVERING CAPACITY OF CORRUGATED SHEETS.

In length of roof or wall according to side lap.

Large Corrugated Sheets (Super-Six or Deep-Six).

No. of Sheets	Fixing with Side Lap of . . .		No. of Sheets	Fixing with Side Lap of . . .	
	2″	7″		2″	7″
1	3′5¼″	3′5¼″	26	85′8¾″	74′9½″
2	6′8¾″	6′3½″	27	89′0¼″	77′5¾″
3	10′0¼″	9′1¾″	28	92′3¾″	80′6″
4	13′3¾″	12′0″	29	95′7¼″	83′4¼″
5	16′7¼″	14′10¼″	30	98′10¾″	86′2½″
6	19′10¾″	17′8½″	31	102′2¼″	89′0¾″
7	23′2¼″	20′6¾″	32	105′5¾″	91′11″
8	26′5¾″	23′5″	33	108′9¼″	94′9¼″
9	29′9¼″	26′3¼″	34	112′0¾″	97′7½″
10	33′0¾″	29′1½″	35	115′4¼″	100′5¾″
11	36′4¼″	31′11¾″	36	118′7¾″	103′4″
12	39′7¾″	34′10″	37	121′11¼″	106′2¼″
13	42′11¼″	37′8¼″	38	125′2¾″	109′0½″
14	46′2¾″	40′6½″	39	128′6¼″	111′10¾″
15	49′6¼″	43′4¾″	40	131′9¾″	114′9″
16	52′9¾″	46′3″	41	135′1¼″	117′7¼″
17	56′1¼″	49′1¼″	42	138′4¾″	120′5½″
18	59′4¾″	51′11½″	43	141′8¼″	123′3¾″
19	62′8¼″	54′9¾″	44	144′11¾″	126′2″
20	65′11¾″	57′8″	45	148′3¼″	129′0¼″
21	69′3¼″	60′6¼″	46	151′6¾″	131′10½″
22	72′6¾″	63′4½″	47	154′10¼″	134′8¾″
23	75′10¼″	66′2¾″	48	158′1¾″	137′7″
24	79′1¾″	69′1″	49	161′5¼″	140′5¼″
25	82′5¼″	71′11¼″	50	164′8¾″	143′3½″

Covering Capacity.

Small (Standard) Corrugated Sheets 3in. Side Lap.

No. of Sheets	Fixing with Side Lap of 1½ Corrugations	No. of Sheets	Fixing with Side Lap of 1½ Corrugations
1	2′7½″	26	62′0″
2	5′0″	27	64′4½″
3	7′4½″	28	66′9″
4	9′9″	29	69′1½″
5	12′1½″	30	71′6″
6	14′6″	31	73′10½″
7	16′10½″	32	76′3″
8	19′3″	33	78′7½″
9	21′7½″	34	81′0″
10	24′0″	35	83′4½″
11	26′4½″	36	85′9″
12	28′9″	37	88′1½″
13	31′1½″	38	90′6″
14	33′6″	39	92′10½″
15	35′10½″	40	95′3″
16	38′3″	41	97′7½″
17	40′7½″	42	100′0″
18	43′0″	43	102′4½″
19	45′4½″	44	104′9″
20	47′9″	45	107′1½″
21	50′1½″	46	109′6″
22	52′6″	47	111′10½″
23	54′10½″	48	114′3″
24	57′3″	49	116′7½″
25	59′7½″	50	119′0″

Table Showing Radii of Curved Sheets.

Inside Radius of Curve	Maximum Length of Straight Portion	Quadrant Measurement
1′0″	8′3″	1′9″
1′3″	7′9″	2′3″
1′6″	7′4″	2′8″
2′0″	6′6″	3′6″
2′6″	5′7″	4′5″
3′0″	4′9″	5′3″

Maximum Overall Length 10′0″.

Note: "Curved-Up" or "Curved-Down" corrugated sheets may be extended, maximum extension being 9in. at not less than 90 degrees to main straight portion which is proportionately reduced in length.

Crating for transport 6d. per sq. yard extra on sheets.

Crating on other products add 18% of value of materials to be transported.

Cartage: Beyond 15 miles radius add 1d. per sq. yard extra.
Beyond 20 miles radius add 2d. per sq. yard extra.

METHOD OF COSTING—CORRUGATED SHEETS.

The examples of cost show the nett cost of roofing sheets per square fixed. Battens are shown separately for inclusion. Ridging, hips, barge mould, starters must be added at per foot run. The costs of these are shown separately.

Cartage rates are the same as for the flat asbestos sheets.

The yardage per square in examples includes loss in laps.

Large Corrugated Sheets 4/2 per sq. yd. plus 50% surcharge 6/3 per sq. yd.

Small Corrugated Sheets 3/10 per sq. yd. plus 50% surcharge 5/9 per sq. yd.

Curved corrugated sheets to order, 3/- per sheet nett extra.

Example of Cost No.1—Per Square Fixed.

Large corrugated sheets (Super-Six or Deep-Six)—**Laid 2 in. side lap.**
Pitch 5¾in.—Depth of Corrugation 2in.—Weight 320 lbs per sq. fixed.

	£	s.	d.
13 sq. yds. Sheets (including lap) @ 4/2 per sq. yd. ...	2	14	2
Add 50% surcharge	1	7	1
Screws and Washers—30 sets @ 8/6 per 100		2	6
Labour, Drilling, Cutting and Fixing	1	10	0
Plastic Bitumen "Seal"		1	0
Nett Cost (without Battens) per square	£5	14	9
Add 36ft. 3 x 1 H.W. Battens @ 97/3		10	10
Labour Fixing and Nails		8	6
Large corrugated with 2 in. sidelap—Nett cost per square	6	14	1

Add ridging, hips, barges, extra on above.
Adjust cartage beyond 15 miles, "On Costs" and Profit.

Example of Cost No. 2—Per Square Fixed.

Large corrugated sheets—**Laid 7 in. sidelap**—Weight 370 lbs. per sq.

	£	s.	d.
15 sq. yds. sheets (including lap) @ 4/2 per sq. yd. ...	3	2	6
Add 50% surcharge	1	11	3
Screws and Washers, 30 sets @ 8/- per hundred ...		2	6
Labour, Drilling, Cutting, Fixing	1	10	0
Bitumen		1	0
Nett Cost without Battens per square	6	7	3
Add battens and Fixing		19	4
Large corrugated sheets—7 in. sidelap—nett cost per sq.	£7	6	7

Add "On Costs", cartage beyond 15 miles and profit.

Example of Cost No. 3—Per Square Fixed.

Small (Standard) Corrugated Sheets—**Laid 3 in. Sidelap.**

Pitch 3in.—Depth of corrugation, 1in.—Weight 300 lbs. per sq. fixed.

	£	s.	d.
13½ sq. yds. sheets (including lap) @ 3/10 per sq. yd. ...	2	11	9
Add 50% surcharge	1	5	11
Screws and Washers, 30 sets @ 7/- per hundred ...		2	2
Labour, Drilling, Cutting and Fixing	1	10	0
Nett Cost without Battens per square	£5	9	10
Add Battens and Fixing		19	4
Small corrugated sheets—3in. sidelap—Nett Cost per sq.	£6	9	2

Add ridging, hips, barges, extra, and adjust cartage and profit.

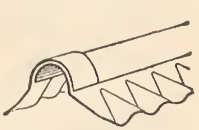
Size of Screws Recommended.

Large Corrugated Sheets	Small Corrugated Sheets
1 thickness use 3in.	1 thickness use 2in.
2 „ „ 3½in.	2 „ „ 2½in.
3 „ „ 4in.	3 „ „ 3in.

ROOFING ACCESSORIES—FIXED.

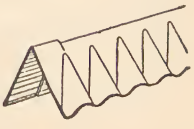
2 Piece Fluted Ride Capping—Including Laps—Per Foot Run Fixed.

	Cost	Plus 50% Sur-Charge	Labour	Cost per Foot
Large Corrugated 2in. Side Lap	1/7½	2/6	1/-	3/6
Large Corrugated 7in. Side Lap.	1/7½	2/6	1/-	3/6
Small Corrugated 3in. Side Lap	1/6½	2/4	1/-	3/4



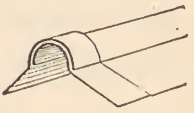
1 Piece Fluted Ridge Capping.

Large Corrugated	1/1	1/8	1/-	2/8
Small Corrugated	11½	1/6	1/-	2/6



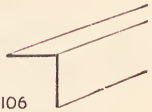
2 Piece Plain Roll Ridging 9in. x 9in.

	1/-	1/6	1/-	2/6



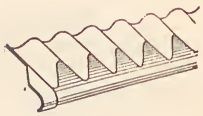
Barge and Corner Moulding.

	Csot	plus 50% Sc.	Labour	Cost per ft.
6in. x 6in.	6d.	9d.	1/-	1/9
8in. x 8in.	8d.	1/-	1/-	2/-
10in. x 10in.	10d.	1/3	1/-	2/3



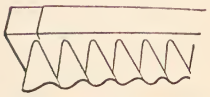
Gutter Flashing.

Large Corrugated 9in. x 2in.	8d.	1/-	1/-	2/-
Small Corrugated 8in. x 2in.	8d.	1/-	1/-	2/-



Apron Flashing.

Large Corrugated 6in. x 2in.	6d.	9d.	1/-	1/9
Large Corrugated 9in. x 2in., 9in. x 3in., 9in. x 4in.,	8d.	1/-	1/-	2/-
9in. x 5in., 9in. x 6in.	10d.	1/3	1/-	2/3
Small Corrugated 6in. x 2in.,	6d.	9d.	1/-	1/9
8in. x 2in., 8in. x 3in.,	8d.	1/-	1/-	2/-
8in. x 4in.				
8in. x 5in., 8in. x 6in	10d.	1/3	1/-	2/3



Specially made to pitch of roof and hand of fixing required.

Side Flashing.

Large Corrugated Sheets	8d.	1/-	1/-	2/-
Small Corrugated Sheets	7d.	10½d.	1/-	1/10½



Scribed Bird-proof Piece.

Large and Small Corrugated Sheets	4½d.	7d.	1/-	1/7



Hip Starters 2/9 ea.—Fixed 3/9. Stop End Caps 3/6 ea.—Fixed 4/6.

SKYLIGHTS—UNGLAZED.

Set in sheets to 10ft. lengths.

Large Corrugated Sheets—Each.

Clear Opening	Size of Glass	6ft.	7ft.	8ft.	9ft.	10ft.
		s. d.	s. d.	s. d.	s. d.	s. d.
3′2″ x 1′6″	3′6″ x 1′9″	23 4	24 8	26 0	27 4	28 4
Plus 50% Surcharge		35 0	36 10	39 0	41 0	42 6
5′0″ x 1′6″	5′4″ x 1′9″	—	—	28 4	29 8	31 0
Plus 50% Surcharge		—	—	42 6	44 6	46 6

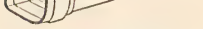
Small (Standard) Corrugated Sheets.

		s. d.	s. d.	s. d.	s. d.	s. d.
3′2″ x 1′3″	3′6″ x 1′6″	21 0	22 0	22 10	23 8	24 8
Plus 50% Surcharge		31 6	33 0	34 5	35 6	37 0
5′0″ x 1′3″	5′4″ x 1′6″	—	—	25 6	26 6	27 4
Plus 50% Surcharge		—	—	38 3	39 9	41 0

EAVES GUTTERS—PER FOOT FIXED.

Length 8ft. 4in.—Effective length 8ft.

Size	Cost	Plus 50% Surcharge	Labour and Brackets	Fixed
		s. d.	s. d.	s. d.
4″	1/0½	1 7	1 3	2 10
5″	1/1½	1 9	1 4	3 1
6″	1/4	2 0	1 5	3 5
8″	1/7	2 5	1 6	3 11



Eaves Gutter.

The following fittings extra on Gutter measurement.

	4″	5″	6″	8″	
	s. d.	s. d.	s. d.	s. d.	
Stop Ends and Outlets	1 3	1 4	1 5	1 7	each
Angles	1 8	1 11	2 1	2 5	,,

BOX GUTTERS—PER FOOT FIXED.

Width	Cost	Plus 50%	Labour	Fixed
	s. d.	s. d.	s. d.	s. d.
9″	2 1	3 2	1 5	4 7
12″	2 4	3 6	1 6	5 0
15″	2 7	3 11	1 9	5 8
30″	3 10	5 9	2 6	8 3



Box Gutter.

For each inch increase in girth add 3d. per foot.
Box Gutter Sumps 24s. (including surcharge) Fixing 4s.—Cost 28s. each.

EXHAUST VENTILATORS.

Exhaust ventilators may be fixed on the ridge or on the slope of the roof. A ridge base is manufactured for ridge fixing and a slope base for fixing on the roof slope.

Costs are shown for both fixings.

If already measured in roof at per square, deduct cost of sheet.

Exhaust Ventilators—Each.

Size	9″	12″	16″	22″
	s. d.	s. d.	s. d.	s. d.
Ventilators	39 0	53 0	62 0	100 0
50% Surcharge	19 6	26 6	31 0	50 0
Nett Cost	58 6	79 6	93 0	150 0
Ridge Base for Vent.	22 0	26 0	30 0	37 6
50% Surcharge	11 0	13 0	15 0	18 9
Nett Cost Ridge Base	33 0	39 0	45 0	56 3
Cost—Vent. and Ridge Base	91 6	118 6	138 0	206 3
Labour Fixing	15 0	15 0	17 6	17 6
Nett Cost—Fixed	104 6	133 6	155 6	223 9

Large Corrugated Slope Bases for Exhaust Vents—Each.

Set in 6ft. to 10ft. sheets.

Sheet Length	Vent. 9in. dia.				Vent. 12in. dia.				Vent. 16in. dia.				Vent. 22in. dia.			
	Cost		plus 50%		Cost		plus 50%		Cost		plus 50%		Cost		plus 50%	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
6	22	9	34	2	27	6	41	3	30	9	46	2	37	3	55	11
7	23	9	35	8	28	9	43	2	31	9	47	8	38	6	57	9
8	25	0	37	6	30	0	45	0	33	0	49	6	39	9	59	8
9	26	3	39	5	31	3	46	11	34	3	51	5	41	0	61	6
10	27	6	41	3	32	6	48	9	35	6	53	3	42	3	64	9

Small Corrugated Slope Bases—Each.

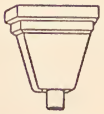
6	21	0	31	6	25	9	38	8	28	9	43	2	—		—	
7	21	9	32	8	26	9	40	2	29	9	44	8	—		—	
8	22	6	33	9	27	6	41	3	30	6	45	9	—		—	
9	23	6	35	3	28	6	42	9	31	6	47	3	—		—	
10	24	3	36	5	29	3	43	11	32	3	48	5	—		—	

Labour Fixing, Screws, etc., 15/- each.

Example: 12in. exhaust vent in 8ft. larger corugated sheet. Vent 79/6 Slope Base 45/- Labour 15/- = 139/6 net cost each.

RAINWATER HEADS—EACH.

Size	18″ x 12″		24″ x 12″		30″ x 12″		Fixing	
	s.	d.	s.	d.	s.	d.	s.	d.
	20	0	25	0	30	0		
Plus 50% Surch.	30	0	37	6	45	0	10	0



Rainwater Head.

ROUND AND RECTANGULAR DOWN PIPES—PER FOOT RUN—FIXED.

Size	Cost		Plus 50% Surch.		Labour and Brackets		Cost Fixed	
	s.	d.	s.	d.	s.	d.	s.	d.
3″ x 2″ and 3″ dia.	1	0	1	6	1	6	3	0
4″ x 2″ and 4″ dia.	1	2	1	9	1	6	3	3
4″ x 3″ and 5″ dia.	1	4	2	0	1	8	3	8
5″ x 4″ and 6″ dia.	1	6	2	3	1	9	4	0

Bends and Junctions—Include in measurement.

Add extra cost per fitting on measurement of down pipes.

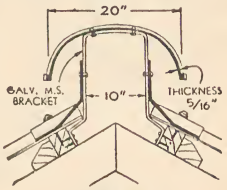
	3″		4″		5″		6″		
	s.	d.	s.	d.	s.	d.	s.	d.	
Bends	1	1	1	3	1	5	1	7	} Each extra cost on
Junctions	2	1	2	5	2	9	3	2	} measurement.
Spreaders	9	0	10	0	11	0	12	0	Base cost each.
Plus 50% surcharge	13	6	15	0	16	6	18	0	Net Cost each.
Galv. Brackets	5	0	6	0	7	6	8	3	Per doz.

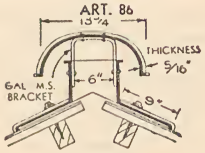
ASBESTOS CEMENT VENTILATION RIDGES.

Asbestos Cement Ventilation Ridge consists of a dome fixed on steel brackets supplied, with apron flashing fixed to roof and extending upward to make the ventilation waterproof. It can be supplied unassembled, with two brackets to each length, with apron flashing, or as single units stop ended at both ends.

Available for large and small (standard) corrugated roofs.

Lengths are 6ft. 6in. with an effective cover of 6 feet.





ART. 89

Costs—Materials Only—Per Foot.

	Basic Cost	50% Surcharge	Nett Cost per Foot
	s. d.	s. d.	s. d.
20in. Dome with Brackets	8 0	4 0	12 0
13in. „ „ „	6 0	3 0	9 0

Apron Flashing—Per Foot.

LARGE CORRUGATION				SMALL CORRUGATION			
Size	Basic Cost	50% Surcharge	Nett Cost	Size	Basic Cost	50% Surcharge	Nett Cost
6″ x 2″	6d.	3d.	9d.	6″ x 2″	6d.	3d.	9d.
9″ x 2″	8d.	4d.	1 0	8″ x 2″	8d.	4d.	1 0
9″ x 3″	8d.	4d.	1 0	8″ x 3″	8d.	4d.	1 0
9″ x 4″	8d.	4d.	1 0	8″ x 4″	8d.	4d.	1 0
9″ x 5″	10d.	5d.	1 3	8″ x 5″	10d.	5d.	1 3
9″ x 6″	10d.	5d.	1 3	8″ x 6″	10d.	5d.	1 3

Large Corrugation Ventilating Ridge.

Example No. 1—Per Foot Run.

	£	s.	d.
20in. Dome with Brackets—per foot		12	0
2 feet 9 in. x 6 in. Flashing @ 1/3		2	6
Add 10% Loss in Laps and Screws, etc.		1	9
Labour, Fixing Apron Flashing—2 feet @ 1/-		2	0
Labour, Fixing Dome, per foot		1	6
Nett Cost per foot		19	9

Small Corrugation Ventilating Ridge.

Example No. 2—Per Foot.

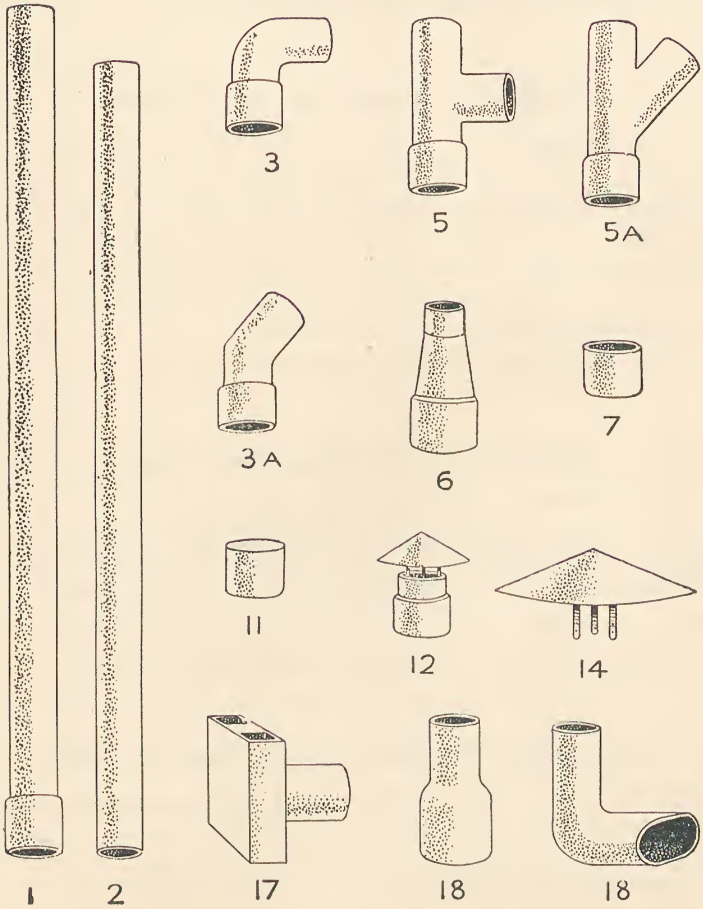
	£	s.	d.
13in. Dome with Brackets		9	0
Apron Flashing 9 in. x 6 in.—2ft. @ 1/3		2	6
Add Loss in Laps 10% and Screws, etc.		1	3
Labour to Flashing		2	0
Labour to Dome		1	6
Nett Cost per foot		16	3

ASBESTOS CEMENT

FLUE PIPES AND FITTINGS.

For all Gas Appliances, Bath Heaters, Stoves, etc.

Flue Pipes and Fittings.



It is not recommended to use asbestos cement flue pipe where flame comes directly in contact with the material or where it is subject to a temperature exceeding 450 degrees Fahrenheit. It is advisable to use metal for the first length of flue from the appliance.

Packing charges, if required, extra at cost.

Socketed Pipe Lengths: 3ft 4in. (3ft. effective) and 6ft. 4in. (6ft. effective).

Plain Pipe Lengths: 2ft., 3ft., 4ft. and 6ft.

In example of cost for socketed pipes, the pipes have been reduced to effective length prices to simplify costing.

Example No. 1—Socketed Pipes—Fixed Per Foot.

Int. Diameter	2″		3″		4″		5″		6″		8″			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.		
Basic Cost	1	0½	1	3	1	5	1	9	2	2	4	2	per	foot.
Plus 50% Surcharge	1	7	1	10	2	2	2	8	3	3	6	3	,,	,,
Fixing	1	0	1	0	1	0	1	3	1	6	1	9	,,	,,
Nett Cost Fixed	2	7	2	10	3	2	3	11	4	9	8	0	,,	,,

Add Flashing through roof say 15/– to £1.

Add Stays if required per set fixed 15/– to £1.

Example No. 2—Plain Pipes—Fixed Per Foot.

Int. Diameter	2″		3″		4″		5″		6″		8″			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.		
Cost	1	0	1	2	1	4	1	8	2	1	3	11	per	foot.
Plus 50% Surcharge	1	6	1	9	2	0	2	6	3	2	5	11	,,	,,
Fixing per foot	1	0	1	0	1	0	1	3	1	6	1	9	,,	,,
Nett Cost Fixed	2	6	2	9	3	0	3	9	4	8	7	8	,,	,,

APPROXIMATE WEIGHTS—SQUARE YARDS TO 1 TON.

Flat Sheets $\frac{3}{16}$in. Thick	130	square	yards
"Tilux" Sheets	120	,,	,,
Large Corrugated Sheets	90	,,	,,
Small Corrugated sheets	100	,,	,,

FLUE PIPE FITTINGS.

Flue pipe fittings, if included in measurement with flue pipe, to be added extra on cost for each fitting.

Example of Cost—Each—Extra on measurement.

Diameter	2″		3″		4″		5″		6″		8″			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.		
Square and Obtuse Bends	3	1	3	5	3	11	5	1	6	2	9	7	each	extra.
Plus 50% Surcharge	4	8	5	2	5	11	7	8	9	3	14	5	,,	,,
Square and Obtuse Tees	3	11	4	6	5	1	5	8	6	9	9	7	,,	,,
Plus 50% Surcharge	5	11	6	9	7	8	8	6	10	2	14	5	,,	,,
Loose Sockets	1	4	1	5	2	0	2	6	3	1	3	11	,,	,,
Plus 50% Surcharge	2	0	2	2	3	0	3	9	4	8	5	11	,,	,,
Blank Cap		11	1	3	1	8	2	0	2	5	3	11	,,	,,
Plus 50% Surcharge	1	5	1	10	2	6	3	0	3	8	5	11	,,	,,
Cone Cap Cowl	5	8	6	2	—		—		—		—		,,	,,
Plus 50% Surcharge	8	6	9	3	—		—		—		—		,,	,,
Chinaman's Hat Cowl	—		—		7	2	8	3	9	9	11	8	,,	,,
Plus 50% Surcharge	—		—		10	10	12	5	14	8	17	6	,,	,,
Box " H " Wall Vent.	—		14	1	15	9	18	0	20	3	—		,,	,,
Plus 50% Surcharge	—		21	2	23	8	27	0	30	5	—		,,	,,

Oval to round adaptors—For **slow combustion** stoves.

Straight adaptor including 50% Surcharge 7/8 each.

Elbow adaptor ,, 50% ,, 10/2 ,,

Oval to round adaptors—For **gas fires**—Including 50% surcharge.

Straight adaptor—4in. Flue 7/8—5in. Flue 8/6 each.

Elbow ,, —4in. ,, 8/6 5in. ,, 9/3 ,,

Tapered adaptors—Including 50% surcharge—each.

2″ to 3″	3″ to 4″	3″ to 5″	3″ to 6″	4″ to 5″	4″ to 6″	5″ to 6″	6″ to 8″
3 5	3 8	4 3	5 2	4 3	5 2	5 2	9 3

When ordering Box " H " Vents. state whether asbestos cement or metal flue.

"TILUX" SHEETS.

Known to the trade as "Tilux" this decorative "marble finish" asbestos cement wall panel, is very suitable for bathrooms, kitchens, pantries, halls, ingle nooks, toilet rooms, hospitals, shops, counter fronts, hotels, etc. It has a highly glazed surface finish, unaffected by water, and makes a distinctive substitute for tiled walls.

It is readily cut with a hand saw and fixed with nickel plated screws, panelled with metal mouldings or cover moulding of "Tilux."

Colours: Old Ivory and Meadow Green.

Sizes 6ft. x 4ft. and 8ft. x 4ft. sheets—Price 11/3 per square yard plus surcharge.

Cover mould 2in.—Similar colours allow approx. 1/– per foot fixed.

Skirting 6in. — „ „ „ „ 1/6 per foot fixed.

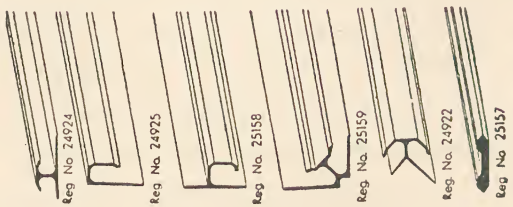
EXAMPLE OF COST—PER SQUARE YARD FIXED.

Without Metal Mouldings.

	s.	d.	
Basic Cost per sq. yd.	11	3	
Add 50% Surcharge	5	8	
Screws		6	
Labour Fixing	2	6	
Nett Cost	19	11	per sq. yd.

"LUMEX" ALUMINIUM MOULDINGS—PER FOOT FIXED.

Straight Joint	Cap Mould	Weather Sill	Interior Angle	Exterior Angle	Angle Strip



Cost		8¾d.			8d.			8½d.			10¾d.			10¼d.			7d.	
Fixing	1	0		1	0		1	0		1	0		1	0		1	0	
Nett Cost	1	9		1	8		1	9		1	11		1	10½		1	7	

ASPHALT

The term " Asphalt " is a general one applied to any tar or bitumen mixture ; therefore the term should be prefaced with some qualifying word or phrase to indicate the purpose for which it is used or required.

Special waterproofing asphalts used in building constructions are known as **mastic asphalts** and may be divided into three main types : roofing, flooring and dampcourse.

A first-class mastic asphalt is composed of natural rock asphalt, native lake bitumen and selected local aggregates, the respective percentages in a mixture varying with the type of work required.

Mastic asphalt is a designed material, which is laid hot to thickness desired by means of wooden floats, and develops extreme toughness when cooked to normal temperature. No special curing period is necessary. It forms a waterproof, homogeneous, jointless, dustless, verminproof, plastic and trafficable paving which requires no periodical maintenance dressings to retain those qualities. Chemically inert, it has no smell nor taint when laid, and is immune to many acids which attack portland cement concrete. Always plastic, it is not subject to shrinkage or other cracks with subsequent loss of waterproof qualities.

Mastic asphalt is laid on roofs in two coats over a membrane to finished thickness of $\frac{3}{4}$in. or 1in., for damp proofing vertically or horizontally in two coats, for waterproofing in three or four coats and for flooring generally in one coat from $\frac{3}{4}$in. to $1\frac{1}{2}$in. Mastic asphalt mixture may be designed for special acid resisting application.

The preparation and laying of mastic asphalt are specialized operations and therefore only reputable firms, employing skilled labour, should be entrusted with this work.

For advice and quotes, see advertisement, page 37A.

Material—Supply only.

Rock Asphalt in $\frac{1}{2}$ cwt. blocks	@	£12 10 0	per ton
Trinidad Native Lake Bitumen, in $4\frac{1}{2}$ cwt. barrels	@	£20 0 0	per ton

Approximate Prices—Labour and materials.

	Per Square Yard
Roofing 2 coats $\frac{3}{4}''$ thick, including membrane	25/–
„ 2 „ 1″ „ „ „	30/–
Dampcourse 2 coats horizontal $\frac{1}{2}''$	12/6
„ 2 „ vertical $\frac{1}{2}''$	17/6
„ 2 „ horizontal $\frac{3}{4}''$	17/6
„ 3 „ vertical $\frac{3}{4}''$	25/–
Flooring $\frac{3}{4}''$ thick 1 coat	17/6
„ 1″ „ 1 „	21/–
„ $1\frac{1}{4}''$ „ 1 „	25/–
„ $1\frac{1}{2}''$ „ 1 „	30/–

Approximate Weight of Mastic Asphalt.

Laid	¾in.	thick	—	¾ cwt.	per square yard
,,	1in.	,,	—	1 cwt.	,, ,, ,,
,,	1¼in.	,,	—	1¼cwt.	,, ,, ,,
,,	1½in.	,,	—	1½cwt.	,, ,, ,,
,,	2in.	,,	—	2 cwt.	,, ,, ,,

Labour Required—Preparing and Spreading.

For roofing or flooring; 6 men working 8 hours, can prepare and spread about 3 tons of mastic asphalt 1in. thick using cauldrons of 10 cwt. capacity.

BITUMINOUS PAVEMENTS.

14 gallons of tar to 1 ton of metal screenings, mixed to 90 degrees, will cover 8 square yards 4in. thick and 10 square yards 3in. thick.

40 gallons of tar will mix 5 tons of ¾in. gauge blue metal.

33 gallons of tar is required for 1 cubic yard of ashes or coke dust.

TAR CONCRETE PAVING—4in. THICK.

Laying :—2in. thick of 1½in. gauge metal, tarred, after spreading.
1¼ in. thick of smaller metal mixed with tar.
Topped with ¾in. thick tar and screenings.
Requires 1½ gallons of tar per square yard.

Approximate Cost 13/6 per square yard laid.

BITUMINOUS FOOTWAYS AND PAVINGS—COUNCIL WORK.

Oil Sheet Asphalt—Hot Mix.

LAID ON 2in. CONCRETE BASE.

Mixture	Thickness	Sq. Yds. per ton	Cost per Sq. Yd.
9.5% of 60/70 Oil Bitumen 8.0% of Limestone Dust 82.5% of Bitumen Sand	1¼″	19	10/–
	¾″	32	7/6
Concrete Base	2″	9.8	11/6

Cold Mix Binder.

Mixture	Thickness	Sq. Yds. per Ton	Cost per Sq. Yd.
3.4% Oil Bitumen 2.5% Tar—65 NYFD.X. 29.4% Bitumen Sand 64.7% 5/16″ Metal	2″	11.4	9/6

Cold Mix Topping.

Mixture	Thickness	Sq. Yds. per Ton	Cost per Sq. Yd.
4.7% Oil Bitumen 3.3% Tar 92.0% ⅛in. Metal	1″	22.1	5/6

COMPOSITION AND BITUMINOUS PAVINGS

ROOFS AND FLOORS.

Mastic Asphalt Paving.

Mastic Asphalt Pavings are tough, homogeneous, jointless, dustless and hygienic plastic surfaces of great durability. Resistant to many acids which attack portland cement concrete. They are to be preferred for breweries, abattoirs, dairies, cool stores, freezing chambers, battery rooms, and other special industrial uses. Maintenance reinstatements in places subject to severe wear can be made homogeneous with adjacent material, and no curing period is required.

See " Asphalt " for details of mastic asphalt.

Approximate Prices—Labour and Materials.

Roofing :	2 coats—$\frac{3}{4}$in. thick—Including	membrane		25/– per sq. yd.
	2 coats—1in. thick—	,,	,,	30/– per sq. yd.
Flooring :	1 coat—$\frac{3}{4}$in. thick—	,,	,,	17/6 per sq. yd.
,,	1 coat—1in. thick—	,,	,,	21/– per sq. yd.
,,	1 coat—1$\frac{1}{4}$in. thick—	,,	,,	25/– per sq. yd.
,,	1 coat—1$\frac{1}{2}$in. thick—	,,	,,	30/– per sq. yd.

Materials to any specification can be bought ready mixed, and delivered to the site ready for placing and compacting.

See advertisement, page 37A.

Bituminous and Asphalt Roofs.

Bituminous roofing felts are manufactured in rolls 3 feet wide by 72 feet long, totalling 216 square feet, sufficient to cover 200 square feet allowing for laps.

The weights and qualities of the material are as follows :—

1-ply	approximately	60 lb. per roll
2-ply	,,	80 lb. per roll
3-ply	,,	100 lb. per roll
5-ply	,,	120 lb. per roll

Bituminous roofing felts can be applied successfully to timber or concrete decks.

To cover flat roofs, laminations of the different plys of material can be formed by cementing the layers together with either cold bituminous adhesive or hot bitumen.

Bituminous roofings are sold under their various trade names, one of the best known being Malthoid.

The application of the material is advised to be carried out by trained applicators and these are generally provided by the manufacturers (see advertisement, page 8.).

Examples of cost :—

1-ply	47/6 per roll	2/–	per square yard
2-ply	56/3 ,, ,,	2/2	,, ,, ,,
3-ply	67/3 ,, ,,	2/10	,, ,, ,,
5-ply	82/ ,, ,,	3/5	,, ,, ,,

Less than 12 yards		More than 12 yards (but less than 24 yards)	
1-ply	2/4 per square yard	1-ply	2/1 per square yard
2-ply	2/7 „ „ „	2-ply	2/3 „ „ „
3-ply	3/1 „ „ „	3-ply	3/– „ „ „
5-ply	3/8 „ „ „	5-ply	3/7 „ „ „

Approximate cost per layer, laid hot, including labour and material.

	1-ply	2-ply	3-ply	5-ply
per square yard	4/9	5/3	6/–	7/1

Either 3-ply or 5-ply bituminous roofing or flooring is recommended for covering floors. The standard specification for roofs is three layers of 2-ply. When various plys of roofing are laid on a flat roof the total cost is generally lower in proportion, for three layers than it would be for a single layer.

Repairs to Leaky Roofs, etc.

Leaks caused by corrosion or rust on iron roofs, cracks in fibro roofs, breaks in gutters, flashings, parapets, windows, etc., can be easily and permanently repaired with Hydroseal Bituminous Mastic, applied with a putty knife.

Hydroseal Mastic is obtainable in 1¼ lb. cartons to 50 lb.pails.

Hydroseal Black

44 gal. drum per gal.	9/8
5 gal. pail per gal.	10/4
10 lb. tin per tin	11/9
5 lb. tin per tin	6/6
2½ lb. cup per cup	3/6
1¼ lb. cup per cup	1/10

Hydroseal White

14 lb. tin per tin	33/6
3½ lb. tin per tin	8/10
1¾ lb. tin per tin	4/7
14 oz. tin per tin	2/4

For Badly Corroded Iron and Fibro Roofs.

Roofs in very bad condition can be treated to give many years of effective service by first treating the major cracks, holes, etc., in the roof with Hydroseal as already described, then painting the roof with a bituminous paint such as Pabco No. 1051 Coating. Allow this prime coat to dry and then apply Asbestoid, a thick bituminous paint obtainable in black and dark red.

The prices of 1 gallon tins of these products are :—

No. 1051 Coating
1 gal. tin per tin 11/–
Coverage—approx. 200/280 square feet per gallon.

Asbestoid Black
1 gal. tin per tin 11/5
Coverage—approx. 150/180 square feet per gal.

Asbestoid Red
1 gal. tin per tin 16/–
Coverage—approx. 150/180 square feet per gal.

Aluminium Roof Paint.

Corrugated iron roofs can be effectively preserved with Alumicool, which is an aluminium roof dressing, incorporating a bituminous base which can be applied by brush or spray. A high percentage of metallic aluminium is suspended in the bituminous base which when applied allows the aluminium flakes to rise to the surface forming a protective shield against rain and sun.

Besides being decorative it will reduce inside temperatures by reflecting the direct rays of the sun.

It can also be applied to tanks, wind-mills, ridges and all metal surfaces.

New work should be allowed to weather approximately six months before applying Alumicool and it is also recommended that a coat of Special Alumicool Primer be applied to both new surfaces and old rusty roofs before finishing off with one coat of Alumicool.

One gallon of Alumicool covers approximately 500 square feet per gallon. Price, 38/6 in 1 gallon tins.

A special Application Service exists in most States of the Commonwealth and work is carried out by trained men using modern equipment.

Bituminous Floorcovering.

Mastipave is a smooth surfaced bituminous floorcovering suitable for old and new work and can be applied over both timber and cement floors.

It is resilient underfoot and does not crack or chip. It is damp-proof and when applied to cement floors it prevents the coldness striking through.

Approximate price supplied and fixed is 6/6 per square yard.

For current quotes see advertisement, page 8.

FLOORING AND PAVING.

Magnesite Composition Flooring.

Magnesite flooring is an attractive, jointless, and durable composition floor, its main content being wood, laid on the job site in various thicknesses, and is generally finished by trowelling to a smooth surface and polished. It is suitable for any floor space in buildings and ships. By virtue of its composition magnesite has the necessary resilience and warmth for comfortable walking. The finished surface should be washed and polished with beeswax as required, and occasionally oiled with raw linseed oil.

In many cases it is laid 1in. thick, comprising a cushion base course §in. thick and a finished wearing top course §in. thick in all available plain colours, combination of colours, and mottled and veined effects. It is coved to walls and fixtures in places where easy cleaning at these junctions are most important.

Where a perfectly true surface is required as a base for carpets, linoleums, or other floor coverings, the cushion base course used alone is recommended.

Magnesite is fire resisting and verminproof, and because of its lightness is particularly advantageous for use on existing floors. Can be laid on concrete steel, or wood.

Concrete Base : When pouring concrete to take magnesite flooring a hard broom brushed over the surface before it sets is necessary to provide a "key" or "grip" for the composition. Existing concrete should be closely picked and grease and oils removed.

Steel Base : When laying floor on a steel base spot welding of anchor grips 18in. apart gives the necessary key.

Wood Base : Contractors for the job provide their own "key" by driving clouts into floor, leaving them projecting about ½in. above floor.

Costs vary according to area covered, working conditions, confined spaces, etc., for which due allowances must be made.

Approximate Prices.

Laid in two courses—1in. thick most colours 26/– to 40/– per sq. yd. laid.
Base course for floor coverings from ... 11/– ,, ,, ,, ,,
Coving to walls, etc. ... ... 1/6 per Lin. foot

For further information, advice, and quotes see "Flooratex" advertisement, page 38B.

TERRAZZO.

"Terrazzo" is the name given to a highly decorative composition of white or ordinary Portland cement with desired colour and marble chippings, ground and polished, when properly set, to a beautiful mottled and durable surface.

It can be worked into patterns or designs, letters and borders as desired.

Terrazzo is also moulded into draining boards, treads and risers, skirtings, nosings, sills, urinal walls and partitions and decorative slabs to fix as dadoes to walls in place of marble or other polished stone.

Terrazzo is obtainable in grey, green, (yellow and pink), buff, cream, red, black, etc., with white or mottled marble chips.

Pavings—Per Square Yard—Supply and Fix.

Not exceeding 1in. thick and including one border.

	Plain	Green	Yellow
Cast in ordinary cement	40/–	47/6	42/6
Cast in white cement	45/–	52/6	47/6

Borders : Labour only on extra border to above add 3/6 per lineal foot.

Paving Margins : Up to 9in. 7/6 per lineal foot.
Over 9in. to 12in. 7/6 per lineal foot.

Squares or centre pieces : Minimum extra charge £1 10s. 0d.

Brasswork : Embedded ¾in. 20 to 22 gauge 1/– per lin. ft.
,, ¾in. under 20 to 16 gauge 1/6 per lin. ft.

Coving : Up to 3in. high—Labour and material 4/6 per lineal foot.
For each inch increase in height add 2/– per lineal foot.

Surface Gutter : Not exceeding 2in. depth and 5in. width 7/6 per lineal foot.

Water Board Regulation Gutter : 10/– per lineal foot.

Terrazzo Treads and Risers.

Supply and fixing not exceeding 12in. width per lineal foot.

	To 5ft. length	Over 5ft. to 7ft. 6in.	Over 7ft 6in. to 10ft. 6in.
Ordinary cement	9/6	10/6	11/6
White cement	11/6	12/-	13/6

Treads or nosings to 12in. widths 6/6 per lineal foot.
Treads or risers with pearl shell incorporated extra 2/- per lineal foot.
Inside cut strings to 12in. depth 15/- per lineal foot.
outside „ „ 17/6 „ „ „
Full curtailed ends of treads and risers £2 5s. 0d. each.

Skirtings—Per Lineal Foot.

6in. skirtings—8/6 per lineal foot. Over 6in. add 6d. per inch per foot.

Dadoes—Per Square Yard.

Plain including capping fixed £2 15 0 per square yard.
„ „ panelled „ £3 5 0 „ „ „

Divisional Slabs—Per Square Foot.

	Usual Colours	Green
Cast in portland cement	10/6	12/6
„ „ white „	13/-	15/-
Ironite double faced	Grey	Green
(Cast in Portland cement)	5/6	8/-
Drilling for locks and hinges	15/- each door	
„ „ angles „ brackets	10/- per pair (includes supply)	

SUPPLY ONLY.

Draining Boards—Per Square Foot.

Up to 6 feet per square foot 7/-
6 feet to 8 feet „ „ „ 8/-
Over 8 feet „ „ „ 9/-
Extra for sprinkling of pearl shell per square foot 2/-
„ „ pearl shell incorporated „ „ „ 3/-

Dished or Beaded Boards—Per Square Foot.

Up to 6 feet per square foot 10/-
6 feet to 8 feet „ „ „ 12/-
Over 8 feet „ „ „ 14/-
Grooving both sides of hole per board 4/-.
Casting in only enamel sink in Board—10/- each.
„ „ „ earthenware sink in Board—15/- each.

The above prices are approximate only.

For further information and quotes see advertisement, page 28.

BALLAST, METAL AND SAND

SPECIFIC GRAVITIES.

Nepean Gravel 2.66–2.67 — Kiama Basalt 2.85–2.88
Prospect Dolerite 2.78–2.79 — Nepean Sand 2.65

Average Weight of Aggregates at Quarry Bin—Cubic Feet Per Ton.					
Aggregate Type	1½″	1″	¾″	½″	⅜″	3/16″
Nepean Gravel (Crushed)	25		26	27	27	28
Crushed Blue Metal (Prospect)	25		25	25	26	27
,, ,, ,, (Sth. Coast)	26		26	27	27	28

Average Yield at Delivery Locations.

	Cubic Feet per Ton
2½″ and 1½″ Crushed Blue Metal and Gravel	24.0
¾″ ,, ,, ,, ,, ,,	25.0
⅜″ ,, ,, ,, ,, ,,	25.5
3/16″ ,, ,, ,, ,, ,,	26.0
1½″ and ¾″ Uncrushed River Gravel	22.0

WEIGHT OF RUBBLE ROAD METAL, Etc.

	p. cu. yd. cwt.	cu. feet per ton
Granite Rubble	30	18
Bluestone Rubble	29	20
Sandstone Rubble	28	19
2½in. Bluestone Metal	26	24–26
2in. Bluestone Metal	25	25–27
2½in. Sandstone Metal	24	22½
2in. Sandstone Metal	23	22
Sand or fine gravel ballast	22½	24
1in. Bluestone Screenings	23	27–28
Small Coke or Breeze	12	41
Shingle or Old Mortar	21½	25
Mortar, New	19	28

Sources of Supply.

Blue Metal:—Dunmore Quarry, Kiama and Prospect-Widemere.
River Gravel:—Emu Plains, Richmond and Castlereagh.

Distribution by road direct and by boat and rail to distributing depots.

¾in. Blue Metal or Gravel—Cost Per Ton Delivered.

Hornsby 30/- — Narrabeen 34/3 — Mosman 32/6 — Manly 34/3 — Lane Cove 30/9 — Ryde 30/3 — Parramatta 27/6 — City 40/3 — Mascot 31/6 — Hurstville 40/3 — Liverpool 28/3 — Concord 29/9.

See advertisement, page 37B.

Sand Prices.

Nepean River Sand 6/- per ton—Ex sand plant.
Delivered to Sydney (40 miles road haulage) 24/- per ton.
Sydney Sand—12/- per cubic yard.
River Sand—10/- per cubic yard.
River sand — 24 cubic feet weighs 1 ton.
Pit ,, — 22 ,, ,, ,, 1 ton.

BELTING

STANDARD TRANSMISSION BELTING—Per Foot.

All Belting subject to 8⅓% Sales Tax.

Width	3-ply	4-ply	5-ply	6-ply	7-ply	8-ply	9-ply	10-ply
2″ ...	2/2	2/6	—	—	—	—	—	—
3″ ...	3/–	3/10	5/–	—	—	—	—	—
4″ ...	3/6	4/11	6/5	8/2	—	—	—	—
5″ ...	5/2	6/6	7/8	9/1	—	—	—	—
6″ ...	—	8/2	9/5	10/11	12/2	—	—	—
9″ ...	—	—	15/1	16/8	18/6	20/4	—	—
12″ ...	—	—	18/10	21/7	23/11	26/11	29/10	—
16″ ...	—	—	—	32/6	36/7	40/10	44/10	49/–
20″ ...	—	—	—	43/1	49/–	54/1	59/6	64/11
24″ ...	—	—	—	54/1	59/6	64/11	70/4	75/10
30″ ...	—	—	—	70/4	75/10	81/2	86/6	92/–

HEAVY DUTY TRANSMISSION BELTING—Per Foot.

Width	3-ply	4-ply	5-ply	6-ply	7-ply	8-ply	9-ply	10-ply
2″ ...	2/5½	3/0½	—	—	—	—	—	—
3″ ...	3/6½	4/6	5/7	—	—	—	—	—
4″ ...	4/–	5/7	7/4	9/1	—	—	—	—
5″ ...	6/7	7/8	8/11	10/5	—	—	—	—
6″ ...	—	9/1	11/–	12/7	14/–	—	—	—
9″ ...	—	—	16/11	19/4	21/2	23/4	—	—
12″ ...	—	—	21/10	24/7	27/6	30/8	34/10	39/–
16″ ...	—	—	—	37/5	42/1	46/11	51/6	56/–
20″ ...	—	—	—	49/11	56/–	62/4	68/7	74/10
24″ ...	—	—	—	62/4	68/7	74/10	81/6	87/5
30″ ...	—	—	—	80/7	87/1	93/6	100/–	106/–

WEDGE ROPES FOR MUTIPLE DRIVES

1¼ in. x ¾ in. Angle 40°				1½ in. x 1 in. Angle 40°	
Internal Circum. inch	Price each	Internal Circum. inch	Price each	Internal Circum. inch	Price each
96·625	72/3	195	137/–	180	170/3
112	81/6	210	148/–	195	189/6
120	85/9	250	176/11	210	209/4
128	90/3	270	191/4	240	249/1
144	101/6	300	211/2	270	277/11
158	111/11	314	221/3	300	310/5
173	121/10	330	231/11	330	341/1
180	126/4	360	252/8	360	371/9

WEDGROPES FOR MULTIPLE DRIVES.

$\frac{1}{2}$ in. x $\frac{5}{16}$ in.			$\frac{21}{32}$ in x $\frac{25}{64}$ in.			$\frac{7}{8}$ in x $\frac{9}{16}$ in.		
Internal Circumference inch	Pitch Length inch	Price each	Internal Circumference inch	Pitch Length inch	Price each	Internal Circumference inch	Pitch Length inch	Price each
23	23·98	5/1	35·125	36·35	9/–	48	49·77	20/–
26	26·98	5/4	42	43·23	9/11	60	61·77	22/7
30	30·98	5/10	45	46·23	10/5	75	76·77	27/1
36	36·98	6/4	60	61·23	13/3	85	86·77	32/–
44	44·98	7/4	75	76·23	17/2	101	102·77	38/4
48	48·98	7/9	85	86·23	19/5	120	121·77	46/11
50	50·98	7/11	90	91·23	20/9	144	145·77	54/2
60	60·98	8/7	99	100·23	23/2	158	159·77	59/7
75	75·98	11/3	105	106·23	24/4	173	174·77	67/8
80	80·98	13/6	120	121·23	28/7	180	181·77	70/5
90	90·98	14/11	158	159·23	39/5	210	211·77	82/1
100	100·98	15/10	180	181·23	45/8	270	271·77	105/7
120	120·98	18/1	240	241·23	71/–	300	301·77	116/10
140	140·98	21/6	300	301·23	87/4	360	361·77	140·9

CONVEYOR BELTING.

STANDARD CONSTRUCTION—Prices per foot.

RUBBER COVERS.

$\frac{1}{8}$ in. Top Cover, $\frac{1}{16}$ in. Pulley Side Cover.

Width	3-ply	4-ply	5-ply	6-ply	7-ply	8-ply
Inches						
6 ...	12/8	14/5	16/2	18/5	20/11	23/7
9 ...	16/7	18/5	20/10	23/6	26/6	28/8
12 ...	18/8	22/2	25/8	29/–	32/10	36/10
15 ...	22/2	26/5	30/2	34/11	38/11	44/5
18 ...	—	30/8	36/–	40/5	45/2	49/8
20 ...	—	34*–	39/5	44/5	49/7	54/1
24 ...	—	40/10	46/1	51/8	57/2	62/2
30 ...	—	50/11	56/11	62/10	68/7	74/2
36 ...	—	60/–	67/8	72/8	80/–	87/–
40 ...	—	65/5	74/4	80/4	89/6	97/7
44 ...	—	72/5	81/10	89/2	99/7	108/8
48 ...	—	78/1	89/10	97/4	109/2	119/10

$\frac{1}{8}$ in. Top Cover, $\frac{1}{8}$ in. Pulley Side Cover, or $\frac{3}{16}$ in. Top Cover, $\frac{1}{16}$ in. Pulley Side Cover.

Width	3-ply	4-ply	5-ply	6-ply	7-ply	8-ply
Inches						
6 ...	13/8	15/2	16/10	19/4	21/6	24/6
9 ...	17/2	19/5	22/4	24/7	27/8	30/2
12 ...	20/10	23/11	27/7	31/4	34/8	38/6
15 ...	24/2	28/5	32/6	37/–	41/2	46/4
18 ...	27/6	33/1	38/6	43/1	48/5	52/8
20 ...	29/6	37/–	42/–	46/11	52/8	57/2
24 ...	33/8	44/5	49/8	55/4	60/6	65/6
30 ...	40/1	55/4	61/5	67/5	73/–	78/8
36 ...	—	65/6	73/–	78/1	85/5	92/2
40 ...	—	71/7	80/7	86/5	95/6	103/8
44 ...	—	79/–	88/5	95/6	106/–	115/1
48 ...	—	85/5	96/10	104/7	116/6	127/2

For intermediate sizes and other types of belting—
See Advertisement, Page 38a.

BRICKLAYER

MEASUREMENT OF BRICKWORK.

The brickwork content of buildings, silos and all structures is measured in rods, cubic feet or per 1,000 bricks, whichever is most suitable to the class of work. All depend on the number of bricks actually laid and prices are estimated on this basis.

Measure all brickwork as solid work and deduct the sum total of large openings in one operation. Measure chimneys, breasts and flues as solid work, width, height and thickness.

Circular work is measured around the external curve and charged 1½ to double rates according to the quality of work required.

It is generally recommended to reduce all brickwork in walls to 9″ work in square feet area and multiply by 9 to obtain the number of bricks.

Example :—A wall 20 ft. x 10 ft. x 18″ thick = 400 sq. ft. of 9″ work. 400 x 9 = 3,600 bricks required.

ONE ROD OF BRICKWORK Contains—

About 3,800 Sydney machine-made bricks.
272 feet super, of 1½ brick, of 13½ inches in thickness.
408 feet super of 1 brick, of 9 inches in thickness.
816 feet to half brick, of 4½ inches thickness.
Or 11⅛ cub. yds., or 306 cub. ft.
Or 235 cub. ft. of bricks and 71 cub. ft. mortar.

FACE MEASUREMENT OF BRICKWORK.

4½ bricks to one super foot of walls half brick thick.
9 bricks to one foot superficial or face of 9 inch thick.
13½ bricks to one foot of brick and a half thick.
10 bricks to one foot superficial of gauged arches.
18 bricks to one foot superficial two bricks thick.
12 bricks in mortar = a cubic foot.

MEMORANDUM

Good Mixture for Mortar, 1 Bag Lime.

Lime mortar of good quality will result from mixing one bag or 2 cwt. of fresh burnt lime with an ordinary tipcart load of sand, 25 cubic feet, and will be sufficient to lay about 1,000 bricks.

For 4½-inch walls it is advisable that an addition of 10 per cent. of cement to mortar mixed as above will produce a stability and firmness in the wall that will more than repay the additional outlay.

To make new chimneys soot proof.—Mix ½ lb. salt to bucket full of Pargetting Mortar.

Space Taken and Material Required to Make 1000 Bricks.

1,000 Bricks stacked close measures 66 cubic feet, Australian machine-made
,, ,, can be made from 3 cubic yards of solid clay.
,, ,, require 8 to 10 cwt. of coal fuel—open kiln.
,, ,, require 2 to 3 cwt. of coal in a Hoffman kiln.
1000 machine-made commons, average weight 3 tons 15 cwts.

MATERIALS REQUIRED FOR A CUBIC YARD OF BRICKWORK.

1728 cubic inches equal 1 cubic foot. 46,656 cubic inches equal one cubic yard.

384 bricks, 4 courses to the foot.

360 bricks, 4 courses to 13 inches.

336 bricks, 4 courses to $13\frac{1}{2}$, or eight layers of 42 bricks each.

$\frac{1}{3}$ bag of stone lime and 8 cu. ft. of sand, with joints averaging $\frac{3}{8}$in. thick.

$1\frac{1}{2}$ bags cement and $4\frac{1}{2}$ of sand, with joints averaging $\frac{1}{4}$-inch thick.

VARIOUS CONTENTS OF A ROD.

$90\frac{3}{4}$ super yards equals one rod of $4\frac{1}{2}$-inch brickwork.

$45\frac{1}{3}$ super yards equals one rod of 9-inch work.

30 2/9 super yards equals one rod of $13\frac{1}{2}$inch work.

Bricks.—3800 bricks of 4 courses to $13\frac{1}{2}$ inches of ordinary brickwork.

TERMS USED.

" Commons " :—Baked in continuous Kilns—used for ordinary work.
" Callows " :—Underbaked bricks—suitable for interior walls.
" Clinkers " :—Overbaked distorted bricks—suitable for foundations.
" O.K's. " :—Burnt in open Kiln—decorative facings.

Machine-made bricks weigh 8 to $8\frac{1}{2}$ lbs. = $18\frac{1}{2}$ tons per rod. 1,000 machine-made bricks weigh 3 tons 15 cwts.

One rod of brickwork requires 170 hods of mortar. 1,000 bricks will require 45 hods of mortar.

BRICK PAVING—BRICKS PER SQUARE YARD.

$\frac{3}{8}$" Joints—Brick on Edge 41—On Flat 28.
$\frac{1}{4}$" ,, ... ,, ,, ,, 43—On Flat 29.

Mortar.—2 loads sand = 48 cubic ft.—4 bags lime = 7 cwt.

BRICKWORK BOND ROD.

9"	Bricks—$\frac{3}{8}$"	Joints—For Openings	Add $\frac{3}{8}$"	—For Piers	Deduct $\frac{3}{8}$".
1	Brick	... 9$\frac{3}{8}$"	12	Brick	... 9′–4$\frac{1}{2}$"
2	,,	... 1′–6$\frac{3}{4}$"	13	,,	... 10′–1$\frac{7}{8}$"
3	,,	... 2′–4$\frac{1}{8}$"	14	,,	... 10′–11$\frac{1}{4}$"
4	,,	... 3′–1$\frac{1}{2}$"	15	,,	... 11′–8$\frac{5}{8}$"
5	,,	... 3′–10$\frac{7}{8}$"	16	,,	... 12′–6"
6	,,	... 4′–8$\frac{1}{4}$"	17	,,	... 13′–3$\frac{3}{8}$"
7	,,	... 5′–5$\frac{5}{8}$"	18	,,	... 14′–0$\frac{3}{4}$"
8	,,	... 6′–3"	19	,,	... 14′–10$\frac{1}{8}$"
9	,,	... 7′–0$\frac{3}{8}$"	20	,,	... 15′–7$\frac{1}{2}$"
10	,,	... 7′–9$\frac{3}{4}$"	$\frac{1}{2}$	,,	... 4$\frac{11}{16}$"
11	,,	... 8′–7$\frac{1}{8}$"	$1\frac{1}{2}$	,,	... 1′–2$\frac{1}{16}$"

BRICKWORK—STOREY ROD.

3″ Thick Bricks—$\frac{3}{8}$ Joints—4 Courses to 13$\frac{1}{2}$ inches.

1 Course	...	3$\frac{3}{8}$″	21	...	5′–10$\frac{7}{8}$″
2	...	6$\frac{3}{4}$″	22	...	6′–2$\frac{1}{4}$″
3	...	10$\frac{1}{8}$″	23	...	6′–5$\frac{5}{8}$″
4	...	1′–1$\frac{1}{2}$″	24	...	6′–9″
5	...	1′–4$\frac{7}{8}$″	25	...	7′–0$\frac{3}{8}$″
6	...	1′–8$\frac{1}{4}$″	26	...	7′–3$\frac{3}{4}$″
7	...	1′–11$\frac{5}{8}$″	27	...	7′–7$\frac{1}{8}$″
8	...	2′–3″	28	...	7′–10$\frac{1}{2}$″
9	...	2′–6$\frac{3}{8}$″	29	...	8′–1$\frac{7}{8}$″
10	...	2′–9$\frac{3}{4}$″	30	...	8′–5$\frac{1}{4}$″
11	...	3′–1$\frac{1}{8}$″	31	...	8′–8$\frac{5}{8}$″
12	...	3′–4$\frac{1}{2}$″	32	...	9′–0″
13	...	3′–7$\frac{7}{8}$″	33	...	9′–3$\frac{3}{8}$″
14	...	3′–11$\frac{1}{4}$″	34	...	9′–6$\frac{1}{4}$″
15	...	4′–2$\frac{5}{8}$″	35	...	9′–10$\frac{1}{8}$″
16	...	4′–6″	36	...	10′–1$\frac{1}{2}$″
17	...	4′–9$\frac{3}{8}$″	37	...	10′–4$\frac{7}{8}$″
18	...	5′–0$\frac{3}{4}$″	38	...	10′–8$\frac{1}{4}$″
19	...	5′–4$\frac{1}{8}$″	39	...	10–11$\frac{5}{8}$″
20	...	5′–7$\frac{1}{2}$″	40	...	11′–3″

Hours required per rod, per thousand, when laying rate per day is known.

Bricks Laid 8 Hours	Hours Per Rod	Hours Per 1000	Bricks Laid 8 Hours	Hours Per Rod	Hours Per 1000
200	152	40	400	76·	20·
250	121·6	32·	450	67·5	17·7
300	101·3	26·6	500	60·8	16·
350	86·8	22·8	550	55·2	14·5
			600	50·6	13·3

AVERAGE CALCULATIONS FOR BRICKWORK.

3 Courses brickwork in height = 10 inches.
13 Stretcher bricks plus joints = 10 feet.
1 super foot 9″ brickwork plus waste = 10 bricks.

Measurement of Footings.

Footings required for 9″ and 11″ cavity walls :—1 Course 22″ Brickwork, 2 courses 18″ and 2 courses 14″ work.

Footings.—If the projection of the footing is in regular offsets, three or more courses high, the average dimension is sufficient ; otherwise, each course must be taken separately.

Note.—12 bricks in mortar = 1 cubic foot.

Obtain the content of footings in cubic feet. Multiply length in feet by thickness in feet by height in feet = Content in cubic feet.

Content in cubic feet x 12 = Number of bricks.

MATERIALS REQUIRED FOR LAYING BRICKWORK.

Standard measure = 1 Rod = 16½ ft. x 16½ ft. x 13½ ins.
(based on a standard brick size = 9″ x 4½″ x 3″).

Unit Quantity	Materials required for 1 unit of Brickwork.				
	¼″ Joints				
	Bricks		Mortar Cu. Ft.	2:1 Cement Mortar	
	No.	Cu. Ft.		Cement bags	Sand Cu. Ft.
1 Rod	3703	260	48	23	46
1 cu. yd. ...	327	22·97	4·03	2·0	4·0
			⅜″ Joints		
1 Rod	3428	241	65	23·2	70
1 cu. yd. ...	302	21·27	5·73	2·04	6·12

Brick Prices per 1000 at Kiln.

Face Bricks, 280/–; Commons, 200/–; Callows and Clinkers, 181/–.

DELIVERY CHARGES.

Cartage first mile, 20/– per thousand. Each additional mile add 1/9 per thousand.

Packing Charges 1/9 per 100 extra.

Loading Bricks into trucks, 3/– per thousand.

Packing in straw, 3/– per 1,000 extra.

PRICES OF MOULDED BRICKS AT YARD.

Single Ended and Double Ended Bullnose, Octagons, Reveals, Reveal Ovolos, Squints (Moulded on Edge):

Face ... ... 325/3 per 1,000
Commons ... 271/– ,, ,,

Splays, O.G. Ovolos, Cornice etc. (Moulded on Flat):

	Headers.	Stretchers.
Face ...	362/3 per 1,000	372/3 per 1,000
Commons	298/– ,, ,,	308/– ,, ,,

Returns 1/– each.

Single Ended Bullnose and Double Ended Bullnose:

Stops ... ...6d. each.
Returns ... ... 1/– each.

PRICE OF BRICKS OVER OR UNDER STANDARD SIZE.

All bricks (apart from Moulded Bricks) over or under standard size 9″ x 4⅜″ x 3″ (including Brickettes) shall be sold at the following prices:—

Face ... ... 325/3 per 1,000
Commons ... 271/– ,, ,,

METHOD OF COSTING BRICKWORK.

In examples of costing brickwork, " Commons " are used as a basis for pricing brickwork.

A nominal distance of 5 miles cartage is used to ensure attention to cartage.

A complete list of brick prices and cartage rates is shown in previous pages and differences can be quickly adjusted by adding or deducting both brick prices and cartage rates.

Two examples of costs are given for face bricks should they be taken separately and priced.

Moulded bricks in sills, buttresses, facings etc., priced separately at per foot run.

Dampcourse :—Measured and priced extra per foot run.

Bonding :—Iron, " Lugsteel " or other bonding priced extra.

Vents, Airbricks, Wall Ties, Cleaning Down and Scaffolding.—Priced separately.—see " Scaffolding."

Example of Cost—No. 1—Brick in Cement.

" Commons " laid per 1,000—4 to 1 Cement	£	s.	d.
1,000 Commons at Kiln at 200/-	10	0	0
5 bags cement at 8/8	2	3	4
1 load sand at 12/-		12	0
Labour laying per 1,000	9	10	0
Water		2	3
Initial cost per 1,000	22	7	7
Add say 5 miles cartage	1	7	0
Nett cost at 5 miles cartage	23	14	7

Cavity Walls : add Wall Ties extra, 3/6 per 1,000 bricks—outside wall measurement.

Add extra cartage, scaffolding, oncosts and profit.

Example of Cost—No. 2—Brick in Cement—Struck joint.

O.K. Face Bricks laid per 1,000—4 to 1 Coment.	£	s.	d.
1,000 Face bricks at kiln at 280/-	14	0	0
5 bags cement at 8/8	2	3	4
1 load sand at 12/-		12	0
Water		2	3
Labour laying per 1,000	10	0	0
Initial cost per 1,000	26	17	7
Cartage and packing say 5 miles	1	8	9
Nett cost at 5 miles cartage	28	6	4

Wall Ties—extra 3/6 per thousand.

Add extra cartage, scaffold, oncosts and profit.

Example of Cost—No. 3—Brick in Cement.

Cost per rod—Commons.	£	s.	d.
3,800 Commons at kiln at 200/-	38	0	0
19 bags cement at 8/8	8	4	8
4 loads sand at 12/-	2	8	0
Labour laying at £9 10s. 0d. per thousand	36	2	0
Water		8	9
Initial cost per rod	85	3	5
Add say 5 miles cartage	5	2	7
Nett cost at 5 miles cartage	90	6	0

For Cavity Walls add Wall Ties—extra 13/6 per rod.
Add extra cartage, scaffold, oncosts and profit.

Example of Cost—No. 4—Brick in Cement.

Cost Per Rod—O.K. Face Bricks.

	£	s.	d.
3,800 Face bricks at kiln at 280/-	53	4	0
19 bags cement at 8/8	8	4	8
4 loads sand at 12/-	2	8	0
Labour laying at £10 per thousand	38	0	0
Water		8	9
Initial cost per rod £102		5	5
Add say 5 miles cartage and packing	5	9	3
Nett cost per rod at 5 miles cartage £107		14	8

For Cavity Walls Add Wall Ties—extra 13/6 per rod.
Add extra cartage etc., as above.

Wall ties have been shown in every example as a reminder to tenderers, but as cavity walls are seldom double "Face brick" walls, is best to price all as "Commons," add wall ties, and additional cost of face bricks.

Example of Cost—No. 5—Brick in Lime Mortar.

Commons—Per 1,000 laid.	£	s.	d.
1,000 Bricks at kiln at 200/-	10	0	0
1 bag lime at 19/-		19	0
1 load sand at 12/-		12	0
Water		2	3
Labour laying per 1,000	8	10	0
Initial cost per 1,000 ... ... £20		3	3
Add say 5 miles cartage rate	1	7	0
Nett cost at 5 miles cartage £21		10	3

Add Wall Ties for Cavity Walls—extra 3/6 per thousand bricks.
Add extra cartage, scaffold, oncosts and profit.

Example of Cost—No. 6—Brick in Lime Mortar.

Commons—Per Rod.

	£	s.	d.
3,800 bricks at kiln at 200/-	38	0	0
4 bags lime at 19/-	3	16	0
4 loads sand at 12/-	2	8	0
Labour laying at £8½ per thousand	32	6	0
Water		8	0
Initial cost per rod	£76	18	0
Add say 5 miles cartage rate	5	2	7
Nett cost at 5 miles cartage	£82	0	7

Add Wall Ties for Cavity Walls—12/6 per rod.
Add extra cartage, scaffold, oncosts and profit.

Example of Cost No. 7—Brick in Lime Mortar—Struck Joint.

O.K. Face Bricks laid per 1,000 in lime mortar.	£	s.	d.
1,000 Face bricks at kiln at 280/-	14	0	0
1 bag lime at 19/-		19	0
1 load sand at 12/-		12	0
Water		2	3
Labour laying per 1,000 bricks	9	0	0
Initial cost per 1,000	£24	13	3
Cartage and packing—say 5 miles	1	8	9
Nett cost at 5 miles cartage	£26	2	0

Wall Ties—extra 3/6 per 1,000 bricks—Face measurement.
Add extra cartage, scaffold, oncosts and profit.

Example Cost No. 7a—Brick in Lime Mortar—Struck Joint.

O.K. Face Bricks—Cost per rod.	£	s.	d.
3,800 Face Bricks at 280/- per thousand	53	4	0
4 bags of lime at 19/-	3	16	0
4 loads of sand at 12/-	2	8	0
Water		8	0
Labour laying at £9 per thousand	34	4	0
	94	0	0
Add cartage and packing—say 5 miles	5	9	3
Nett cost per rod—5 miles cartage	£99	9	3

Wall Ties—add 13/6 per rod extra.
Add extra cartage, scaffold, on costs and profit.

Example of Cost No. 7b—Brick in "Compo."

Commons—Per 1,000 Laid.	£	s.	d.
1,000 Commons at kiln at 200/-	10	0	0
5 bags cement at 8/8	2	3	4
1 bag " Frolime " at 6/6		6	6
1 load sand at 12/-		12	0
Water		2	3
Labour laying at £8½ per thousand	8	10	0
Initial cost per 1,000	£21	14	1
Say cartage 5 miles	1	7	0
Nett cost at 5 miles cartage	£23	1	1

Add Wall Ties for Cavity Walls—extra 3/6 per thousand bricks.
Add extra cartage, scaffolding, oncosts and profit.

PIERS.

Piers :—9″ x 9″ Piers under floor bearers can be measured in lineal feet in height, added together and priced per foot run.

Cost 4/3 per foot — £21 per 100 feet run.

Add stump caps (24 Gauge Galv. Iron)—1/3 each

WALL TIES IN CAVITY WALLS.

Wall Ties are inserted in 11″ Cavity Walls to tie the walls. In cavity walls an additional cost for wall ties must be reckoned.

No. 8 Gauge Wall Ties—5/6 per 100—55/- per thousand.

1,000 Bricks in Cavity Walls require 60 Wall Ties = 3/6.

1 Rod Brickwork in Cavity Walls requires 228 Wall Ties = 13/6.

BRICKWORK IN WEATHERBOARD AND ASBESTOS CEMENT COTTAGES, KITCHEN FIREPLACE AND CHIMNEY.

Overall Dimensions, 5ft. wide, 10ft. high, 6ft. chimney.
Fireplace 3′–6″ wide, 18″ deep with 9″ backs and sides.

No. 8 Example of Cost.	£	s.	d.
1,100 Commons at kiln at 200/-	11	0	0
1 bag lime at 19/-		19	0
1 bag cement at 8/8		8	8
$1\frac{1}{10}$ loads sand at 12/-		13	3
Labour laying at £9 per 1,000	9	18	0
Water		2	6
Arch bar		7	6
Pargetting walls inside		5	0
Chimney Pot say		11	0
Initial cost	£24	4	11
Add say 5 miles brick cartage	1	9	9
Nett cost	£25	14	8

Add extra cartage, scaffolding, oncosts and profit.

DOUBLE CHIMNEY—Breasts 5 Feet.

No. 9 Example of Cost.	£	s.	d.
1,800 Commons at kiln at 200/–	18	0	0
2 bags lime at 19/–	1	18	0
2 bags cement at 8/8		17	4
2 loads sand at 12/–	1	4	0
Labour laying at £9	16	4	0
Water		4	0
2 Arch bars at 7/6		15	0
Pargetting walls inside		7	6
2 chimney pots, say	1	2	0
Initial cost	£40	11	10
Add say 5 miles cartage rate	2	8	7
Nett cost	£43	0	5

Add extra cartage, scaffold, oncosts and profit.

BRICK EARTH CLOSET—4½″ Walls.

External Measurements 5′–5⅝″ x 4′–8¼″ x 8ft. high.
Internal Measurements, 4′–8¼″ x 3′–10⅞″ x 8ft. high.
Footings—2 courses of 9″ brickwork.

No. 10 Example of Cost.	£	s.	d.
750 bricks at kiln at 200/–	7	10	0
¾ bag lime at 19/–		14	3
½ bag cement at 8/8		4	4
¾ load sand at 12/–		8	0
Water		1	6
Labour laying at £9	6	15	0
Concrete floor 2 yds. at 18/–	1	16	0
Roof timbers 25 super H.W. at 90/–	1	2	6
Cartage timber		2	0
Labour fixing plates, rafters, battens, 3 hrs. at 6/– ...		18	0
Galvanized roof, 3/7′ at 6/6 including nails		19	6
Fixing Iron—2 rolls		7	6
4 x 2 H.W. Door Frame and Stop Mld.		15	0
Plugging and fixing		10	0
1 ledge door (Oregon)	3	10	0
Lock, 10/–; Hinges, 1/6		11	6
Labour hanging door and fixing lock		10	0
4 airbricks (louvre) at 1/3		5	0
Painting and colouring	2	0	0
Initial cost	£29	0	1
Add say 5 miles brick cartage	1	0	3
Nett cost	£30	0	4

Add extra cartage, oncosts and profit.
Add pan and seat if specified.
If water closet add pedestal, seat, cistern and plumbing and drainage work necessary.

WASHING COPPER—12 Foot Chimney.

No. 11 Example of Cost.	£	s.	d.
450 Commons at kiln at 200/-	4	10	0
½ bag lime at 19/-		9	6
½ load sand at 12/-		6	0
Labour laying at £9	4	1	0
Water		1	6
1 light, seamless copper	2	0	0
1 door, frame and grate and fix		15	0
Rendering in Cement	1	0	0
Initial cost	13	3	0
Add say 5 miles cartage rate		13	6
Nett cost	13	16	6

Add extra cartage, scaffold, oncosts and profit.

BRICK PAVING—Per Square Yard.

No. 12 Example of Cost—Brick on Edge—¼″ Joint.	£	s.	d.
43 bricks at kiln at 200/-		8	8
Cement		1	6
Sand			6
Water			3
Labour laying at £7 thousand		6	4
Initial cost		17	3
Add 5 miles cartage rate			11
Nett cost		18	2
Add sand bedding			6
Nett cost per yard		18	8

Add extra cartage, oncosts and profit.

No. 13 Example of Cost—Brick on Flat—¼″ Joint.	£	s.	d.
29 bricks at kiln at 200/-		5	10
Cement		1	1
Sand			5
Water			3
Labour laying at £7 per thousand		4	3
Initial cost		11	10
Add 5 miles cartage rate			9
Nett cost per sq. yard		12	7
Add sand bed if any			5
Nett cost on sand bed per sq. yard		13	0

Add extra cartage, oncosts and profit.

BRICKETTES.

Brickettes for fireplaces are manufactured in colours red, brown and mottled, glazed and unglazed and measure $6\frac{1}{2}''$ x $3''$ x $1\frac{1}{4}''$. Also made with bullnose angles. Price £13 3s. 6d. per thousand delivered in metropolitan area (uncrated).

An angle fireplace with an opening for a combustion stove requires 244 brickettes for a fireplace say 4 ft. high and 4 ft. wide.

No. 14 Example of Cost for Fireplace above.

	£	s.	d.
Brickettes—244 at 325/3 per 1,000	3	19	6
Sand—$\frac{1}{8}$ ton at 12/– ton		2	0
Cement—$1\frac{1}{2}$ bags at 8/8 each		13	0
Labour fixing brickettes	2	0	0
Nett cost angle fireplace	£6	14	6

Add oncosts and profit.

An angle fireplace with opening 1′–9″ x 1′–9″ for grate requires 200 brickettes for a fireplace say 3′–3″ high and 5′–3″ wide, and for an inner hearth requires 20 more brickettes. The example of this cost would be similar to the above—£6 14s. 6d.

A plain fireplace with opening 2′–6″ high and 2′–6″ wide for an open fire, requires 320 brickettes, 200 brickettes to line opening and 100 brickettes for the outer hearth, for a fireplace say 7ft. long, 4ft. high and standing 12″ from wall.

No. 15 Example of Cost for Fireplace above.

	£	s.	d.
Brickettes 620 at 325/3 per 1,000	9	19	7
Sand—$\frac{1}{2}$ ton at 12/– ton		6	0
Cement—4 bags at 8/8 each	1	14	8
Labour fixing brickettes	4	10	0
	£16	10	3

Add oncosts and profit.

SURFACE OR SQUARE MEASURE.

144 Sq. Inches	equal 1 Sq. Foot		40 Sq. Piles	equal 1 Rood	
9 Sq. Feet	,, 1 Sq. Yard		4 Roods	,, 1 Acre	
$30\frac{1}{4}$ Sq. Yards	,, 1 Sq. Rod		10 Sq. Chains	,, 1 Acre	
16 Sq. Rods	,, 1 Sq. Chain		640 Acres	,, 1 Sq. Mile	

1 Acre contains 100,000 Sq. Links.
1 ,, ,, 4,840 Sq. Yards.

A square whose side is $69\frac{1}{2}$ Yards is approximately 1 Acre.

Table showing bricks required for walls of all areas, including 7 per cent. waste—for exact amount deduct $\frac{1}{15}$.

Area of wall. sq. feet.	Bricks thick and bricks required.				
	½-brick.	1-brick.	1½-brick.	2-bricks.	2½-bricks.
1	5	10	15	20	25
2	10	20	30	40	50
3	15	30	45	60	75
4	20	40	60	80	100
5	25	50	75	100	125
6	30	60	90	120	150
7	35	70	105	140	175
8	40	80	120	160	200
9	45	90	135	180	225
10	50	100	150	200	250
20	100	200	300	400	500
30	150	300	450	600	750
40	200	400	600	800	1,000
50	250	500	750	1,000	1,250
60	300	600	900	1,200	1,500
70	350	700	1,050	1,400	1,750
80	400	800	1,200	1,600	2,000
90	450	900	1,350	1,800	2,250
100	500	1,000	1,500	2,000	2,500
200	1,000	2,000	3,000	4,000	5,000
300	1,500	3,000	4,500	6,000	7,500
400	2,000	4,000	6,000	8,000	10,000
500	2,500	5,000	7,500	10,000	12,500
600	3,000	6,000	9,000	12,000	15,000
700	3,500	7,000	10,500	14,000	17,000
800	4,000	8,000	12,000	16,000	20,000
900	4,500	9,000	13,500	18,000	22,500
1,000	5,000	10,000	15,000	20,000	25,000
2,000	10,000	20,000	30,000	40,000	50,000
3,000	15,000	30,000	45,000	60,000	75,000
4,000	20,000	40,000	60,000	80,000	100,000
5,000	25,000	50,000	75,000	100,000	125,000
6,000	30,000	70,000	90,000	120,000	150,000
7,000	35,000	70,000	105,000	140,000	175,000
8,000	40,000	80,000	120,000	160,000	200,000
9,000	45,000	90,000	135,000	180,000	225,000
10,000	50,000	100,000	150,000	200,000	250,000
20,000	100,000	200,000	300,000	400,000	500,000
30,000	150,000	300,000	450,000	600,000	750,000
40,000	200,000	400,000	600,000	800,000	1,000,000
50,000	250,000	500,000	750,000	1,000,000	1,250,000

BRICKWORK OF VARIOUS HEIGHT AND THICKNESS.

Weight per foot run of Brick Walls in Pounds.

Height of Wall in ft.	Thickness of Wall in inches.					
	4½″	9″	13½″	18″	22½″	27″
1	42	84	126	168	210	252
2	84	168	252	336	420	504
3	126	252	378	504	630	756
4	168	336	504	672	840	1008
5	210	420	630	840	1050	1260
6	252	504	756	1008	1260	1512
7	294	588	882	1176	1470	1764
8	336	672	1008	1344	1680	2016
9	378	756	1134	1512	1890	2268
10	420	840	1260	1690	2100	2520
11	462	924	1386	1848	2310	2772
12	504	1008	1512	2016	2520	3024
13	546	1092	1638	2184	2730	3276
14	588	1176	1764	2352	2940	3528
15	630	1260	1890	2520	3150	3780
16	672	1344	2016	2688	3360	4032
17	714	1428	2142	2856	3570	4284
18	756	1512	2268	3024	3780	4536
19	798	1596	2394	3192	3990	4788
20	840	1680	2520	3360	4200	5040
21	882	1764	2646	3528	4410	5292
22	924	1848	2772	3696	4620	5544
23	966	1932	2898	3864	4830	5796
24	1008	2016	3024	4032	5040	6048
25	1050	2100	3150	4200	5250	6300
26	1092	2184	3276	4368	5460	6552
27	1134	2268	3402	4536	5670	6804
28	1176	2352	3528	4704	5880	7056
29	1218	2436	3654	4872	6090	7308
30	1260	2520	3780	5040	6300	7560

MEASURE OF SOLIDITY.

1,728 Cubic Inches equal 1 Cubic Foot

27 ,, Feet ,, 1 Cubic Yard

5 ,, Feet ,, 1 Barrel Bulk Shipping

40 ,, Feet ,, 1 Ton Shipping (Merchandise)

42 ,, Feet ,, 1 Ton Shipping (Timber)

Table showing the value from One, to Two Hundred and Seventy-two Feet of reduced Brick Work, from £3 to £12 per Rod.

Feet.	At £3 per Rod.			At £4 per Rod.			At £6 per Rod.			At £8 per Rod.			At £10 per Rod.			At £12 per Rod.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	0	0	2½	0	0	3½	0	0	5	0	0	7	0	0	9	0	0	10½
2	0	0	5	0	0	7	0	0	10½	0	1	2	0	1	5½	0	1	9
3	0	0	8	0	0	10½	0	1	4	0	1	9	0	2	2	0	2	7½
4	0	0	11	0	1	2	0	1	9	0	2	4	0	2	11	0	3	6
5	0	1	1	0	1	5½	0	2	2	0	2	11	0	3	8	0	4	5
6	0	1	4	0	1	9	0	2	8	0	3	6	0	4	5	0	5	3½
7	0	1	7	0	2	1	0	3	1	0	4	1	0	5	2	0	6	2
8	0	1	9	0	2	4	0	3	6	0	4	8½	0	5	10½	0	7	0½
9	0	2	0	0	2	8	0	3	11½	0	5	3½	0	6	7	0	7	11
10	0	2	3	0	2	11	0	4	5	0	5	10½	0	7	4	0	8	10
15	0	3	4	0	4	5	0	6	7	0	8	10	0	11	0	0	13	3
20	0	4	5	0	5	10½	0	8	10	0	11	9	0	14	8½	0	17	8
25	0	5	6	0	7	4	0	11	0	0	14	8½	0	18	4½	1	2	0½
30	0	6	7	0	8	10	0	13	3	0	17	8	1	2	1	1	6	6
40	0	8	10	0	11	9	0	17	8	1	3	6	1	9	5	1	15	3½
50	0	11	0	0	14	8½	1	2	1	1	9	5	1	16	9	2	4	1
60	0	13	3	0	17	8	1	6	5½	1	15	3½	2	4	1	2	12	11
70	0	15	5	1	0	7	1	10	10½	2	1	2	2	11	5½	3	1	9
80	0	17	8	1	3	6	1	15	3½	2	7	0½	2	18	10	3	10	7
90	0	19	10	1	6	5½	1	19	8½	2	12	11	3	6	2	3	19	5
100	1	2	1	1	9	5	2	4	1	2	18	10	3	13	6	4	8	2
110	1	4	3	1	12	4	2	8	6	3	4	8	4	0	10½	4	17	0½
120	1	6	6	1	15	3½	2	12	11	3	10	7	4	8	3	5	5	10½
130	1	8	8	1	18	3	2	17	4	3	16	5½	4	15	7	5	14	8½
140	1	10	11	2	1	2	3	1	9	4	2	4	5	2	11	6	3	6
150	1	13	1	2	4	1	3	6	2	4	8	3	5	10	3½	6	12	4
160	1	15	4	2	7	0½	3	10	7	4	14	1	5	17	8	7	1	2
170	1	17	6	2	10	0	3	15	0	5	0	0	6	5	0	7	10	0
180	1	19	9	2	12	11	3	19	5	5	5	10½	6	12	4	7	18	10
190	2	1	11	2	15	10½	4	3	10	5	11	9	6	19	8	8	7	8
200	2	4	1	2	18	10	4	8	3	5	17	8	7	7	0½	8	16	5½
210	2	6	4	3	1	9	4	12	8	6	3	6	7	14	5	9	5	3½
220	2	8	6	3	4	8½	4	17	0½	6	9	5	8	1	9	9	14	1
230	2	10	9	3	7	8	5	1	5½	6	15	3½	8	9	1	10	2	11
240	2	12	11	3	10	7	5	5	10½	7	1	2	8	16	5½	10	11	9
250	2	15	2	3	13	6	5	10	3½	7	7	0½	9	3	10	11	0	7
260	2	17	4	3	16	5½	5	14	8½	7	12	11	9	11	2	11	9	5
270	2	19	7	3	19	5	5	19	1½	7	18	10	9	18	6	11	18	3
272	3	0	0	4	0	0	6	0	0	8	0	0	10	0	0	12	0	0

By adding, halving, or doubling, as may be requisite, any quantity or value can be obtained from the above Table.

MILLED OR READY MIXED LIME MORTAR.

Ready mixed mortar is becoming increasingly popular, due to the machine mixing being more satisfactory and to the facilities of handling on job. The mortar is available in plain white or colours.

The addition of 10 per cent. cement added to the lime mortar received is recommended by the Rural Bank and Architects.

READY MIXED MORTAR

	Areas other than Northern Suburbs.	Northern Suburbs.	Approx. No. of Bricks Quantities will lay.
White	£ s. d.	£ s. d.	
44 cu. ft. ...	4 8 6	4 10 6	1750
33 ,, ...	3 10 9	3 12 9	1320
22 ,, ...	2 12 3	2 14 3	880
11 ,, ...	1 10 0	1 12 0	440
Coloured ...			
44 cu. ft. ...	6 8 6	6 10 6	1750
33 ,, ...	5 2 9	5 4 9	1320
22 ,, ...	3 15 9	3 17 9	880
11 ,, ...	2 3 9	2 6 0	440

BRICKWORK SUNDRY MATERIALS.

Ventilated Air Bricks Terra Cotta. Per Dozen.

	Terra Cotta	Glazed
9″ x 6″ Square hole	14/6	16/–
9″ x 6″ Louvre	17/–	18/9
9″ x 3″ Square hole	13/–	15/–
9″ x 3″ Louvre	15/–	16/–
9″ x 6″ Cowl Hooded square hole or louvre (two thirds covered)	40/6	45/3
9″ x 6″ Hooded, sloped pattern, square hole ...	40/6	45/3

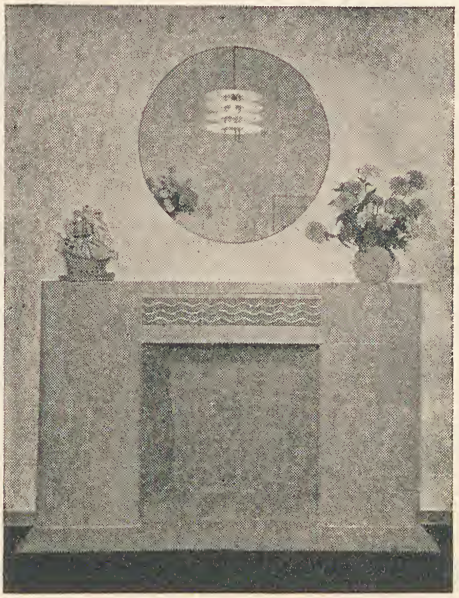
Air Bricks—White or Cream.

9″ x 6″ Square hole—per doz.	16/9
9″ x 6″ Louvre—per doz.	20/3
9″ x 6″ Hooded vents (two thirds covered)—per doz. ...	45/3
9″ x 6″ Hooded vents (one half covered)—per doz. ...	45/3

Chimney Pots—Terra Cotta or glazed. Each

Round pattern plain up to 12″ high	8/6
,, ,, ,, 13″—18″ ,, ...	11/–
,, ,, ,, 19″—24″ ,, ...	15/6
Hoods only for round chimney pots	5/9
Chimney pots with fixed hoods	13/–
Letter box brick, 9″ x 6″	12/8

GLAZED TERRA-COTTA FIREPLACE SURROUND.



Design No. 6.

The typical example of a Terra-Cotta Fireplace Surround illustrated above shows the standard glazed finish adopted—a warm cream mottled with brown.

Terra-Cotta Fireplace Surrounds are easily fixed to brick or concrete backing. The units are carefully made to the correct size and fitted prior to despatch from the works, but it is advisable to lay them out on the floor prior to installation, and exactly determine the finished width of the lintel course, plus the requisite $\frac{1}{8}$" allowance for each joint, thus determining the exact overall width of the fireplace surround. Before fixing is commenced, the units should be thoroughly "wetted," then placed in their correct position and filled in behind with a cement composition in the proportion of three parts of clean sand to one part of cement. To ensure correct adhesion and the filling of all voids behind the blocks, tamp the cement composition with a rod or lath. Supports should be provided, where necessary, until the cement has "set." The $\frac{1}{8}$" jointing of the blocks should be as inconspicuous as possible, and for this reason it is advisable to use a coloured mortar that matches the colour of the glazed Terra-Cotta.

Manufactured in a variety of designs.

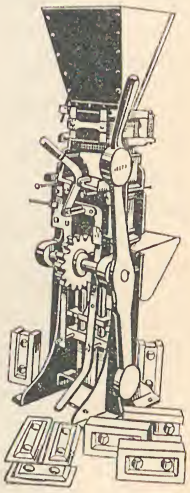
Approx. Price No. 6 Design—£7 12s. 0d.

Delivered Metropolitan area. Country—crating and packing extra at cost—F.O.R. Sydney.

For other designs see Manufacturers' Advertisement, page 35B.

CEMENT BRICKMAKING MACHINE.

The "new method" bricks made by this machine make it a simple matter for a person unskilled in bricklaying to make a perfect job of Brick construction. The bricks are laid close against each other without mortar joints, and after 7 or 8 courses are laid liquid mortar is poured down the holes to percolate along the continuous frog in the bricks. This makes the structure one solid mass of great strength. For average work no reinforcement is necessary.



In the case of tanks and silos reinforcement with No. 8 Gauge fencing wire is used both vertically and horizontally and when grouted forms one solid mass. A splayed end brick is made by this machine for cylindrical work.

The machine, by a simple adjustment, can be set to make standard shape bricks 9″ x 4½″ x 3″ should they be required.

The machine is approved by Dept. of Works and Housing, Commonwealth Experimental Building Station and local councils.

The Truline Brick Machine is a unit which is a valuable asset to a builder's plant in any part of the country, also to the man on the land.

SPECIFICATION—STOCK SIZE TANK.

12 Feet Diam.—8 Feet High.

Foundation Base—Concrete 12″ Thick—4 cu. yards.
1700 "New Method" Bricks for Tank—Splayed ends.
2500 Feet No. 8 Fencing Wire—50 super yds. ¾″ Rendering Inside.

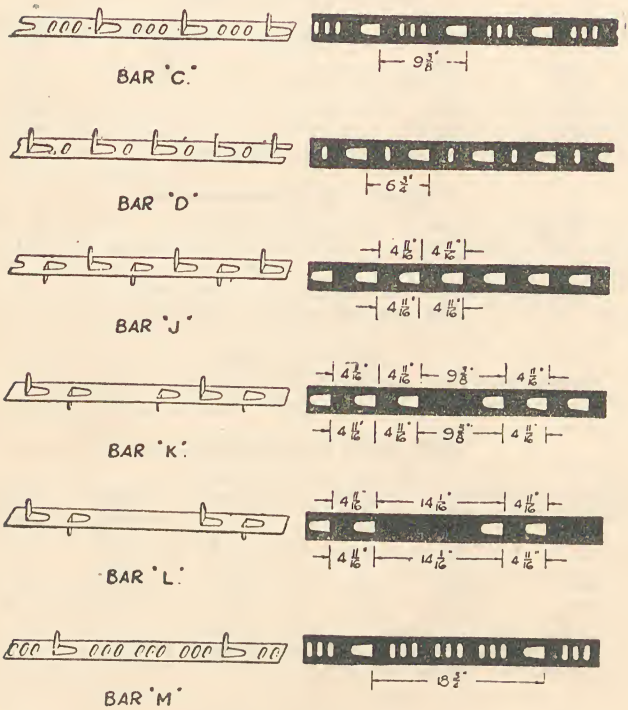
	£	s.	d.
"Truline Standard" brick machine, capable of producing standard shape and size bricks (9″ x 4⅜″ x 3″)	68	10	0
"Truline New Method" brick machine, capable of producing New Method bricks (9″ x 4½″ x 3″). This machine is also adaptable for making standard shape bricks of the same size	74	0	0
These prices are ex-works Alexandria, plus crating and packing	4	0	0
Loading on rail		10	0
Loading on boat	1	0	0

Moulds for making stock size tank bricks (12′ dia.) in the New Method machine are available at a cost of £4 per set. It is essential to advise when ordering if tank bricks are likely to be required in the future, in which case the machine is prepared during manufacture to take tank moulds. This preparation costs £1 which is credited against the cost of moulds, if ordered subsequently. When machines are prepared in this way a minimum tank dia. of 12′ is allowed for. Smaller and larger tanks can, however, be provided for if specially required at £5 5s. 0d. per set.

For Further Information See Advertisement, Page 51.

BRICKWORK REINFORCEMENT

"Lugsteel" Reinforcement.



"Lugsteel" brickwork reinforcement is made from 3in. x 10 gauge steel, with lugs spaced to fit into the perpendicular joints of brickwork, designed to transfer the horizontal stresses from the brickwork to the steel, this giving the brickwork the strength of a beam.

Lugsteel, besides being an improvement on concrete and timber lintels, arch bars, flat bars, etc., is efficiently used in brickwork foundation walls, binding courses at the top of a series of openings and general reinforcement against cracking or settlement. It is easily handled as it is cut to the required lengths and marked to a location plan ready for placing in position.

Manufactured in types to suit all bonds in brickwork and to suit any constructional differences that may arise in buildings.

Available in lengths up to 25 feet.

Approximate price 1/6 per foot.

For further information see advertisement, page 31.

B.R.C. Brick Reinforcement.

(12 gauge galvanized wire at 2in. centres longitudinally x 12 centres transversely.)

IN ROLLS 80ft. LONG.

Wall Width	Type	Width (Flush)	Nos. of Wires	Price Per Roll
4½″	B1	2″	2	8/6
9″	B2	6″	4	12/6
14″	B3	10″	6	16/6
18″	B4	14″	8	20/–

See advertisement, page 20.

" Exmet " Brick Reinforcement.

" Exmet " expanded steel reinforcement is a diamond shaped mesh reinforcement 2½in. in width and manufactured from 24 gauge steel.

Supplied in rolls 270ft. length—35/– per roll.

See advertisement, page 75.

Brictor Bonding.

Width 2½in., 1in. mesh — 6/6 per roll of 25 yards
„ 2½in., ½in. „ — 11/– „ „ „ 25 „

HOOP IRON FOR BONDING, &c.

(*Weight per Lineal Foot.*)

Gauge No.	Weight in lbs.	Width in inches	Gauge No.	Weight in lbs.	Width in inches
13	0.62	2	16 = 1/16″	0.31	1½
14	0.47	1¾	17	0.21	1⅛
15	0.36	1½	18	0.16	1
15	0.34	1⅜	19	0.12	⅞

½ cwt bundle 1½in. x 16 gauge contains 180 feet.
½ cwt. „ 1¾in. x 16 „ „ „ 210 feet.

POINTING AND CLEANING DOWN

Brickwork and Stonework.

The pointing of brickwork and stonework can be done in a variety of colours, according to individual tastes. The usual colours chosen for this work are natural grey, white, yellow, red and black.

The colours (oxides) at present being used are of good quality and do not fade to any marked degree. On old work where a black joint prevails, a good job is done by using a new cement black joint.

Brickwork—Tuckpointing and Flatpointing.

Old work.—Most of the tuckpointing and flatpointing is done to old work, because it is, at present, not the vogue.

In measuring walls include all openings to balance extra work on reveals, etc.

Cost—Per Square Yard.

Re-tuckpointing old work any colour — 7/- per sq. yd.
Flatpointing ,, ,, ,, ,, — 7/- per sq. yd.
At the finish of job, patching of damaged work, etc. charged at 7/6 per hour.
New Brickwork—Tuckpointing or Flatpointing 4/6 sq. yd.

Fire Places—Tuckpointed.

A single job such as a fireplace in residence is usually contracted at 7/6 per hour plus fares and allowances. The cost varies according to the size of fire place and the detailed plan, which may be simple in design or otherwise.
Fire places—From 15/- to £1 per sq. yd.

Cleaning Down.

The cleaning down of brickwork is done by using spirit of salt (commercial Muriatic acid) in the proportion 6 water to 1 acid. The work is usually done from a ladder using a fibre whitewash brush.
The cost is estimated at per square (100 sq. ft.).

Costs—Per Square.

When lime mortar is used in walls 10/- per square
,, cement ,, ,, ,, ,, ,, 12/- ,, ,,
Two-storey work—lime mortar 11/- ,, ,,
,, ,, ,, cement ,, 13/- ,, ,,
When cleaning down on cement mortar is finished, a certain darkening of walls remains which disappears after a lapse of time.

Pointing Stonework—Per Square Yard.

NEW WORK—FLAT POINTED.
Flat pointed in Natural Grey — 3/- per square yard.
,, ,, ,, Colours — 3/3 ,, ,, ,,

OLD WORK.
Flat pointed in Natural Grey — 3/6 ,, ,, ,,
,, ,, ,, Colours — 3/9 ,, ,, ,,

Tuckpointing new work in colours 3/9 per square yard.

Tuckpointing old work in colours 4/- per square yard.

FLAGSTONES AND CRAZY WORK.

Flagstones and crazy work are used in porches, entrances, paths, etc.

COST—POINTING.

Pointing in colours if filled — 4/- per square yard.
Filling and pointing — 4/6 ,, ,, ,,
Small stones—Pointing — 4/6 ,, ,, ,,

Contractor to add profit on all items.

DAMPCOURSE

Waterproofing Compounds:—Mastic Asphalt is one of the best waterproofing compounds for either vertical or horizontal waterproofing. Structures waterproofed in Biblical times with asphalt from natural exudations are still waterproof ruins to-day.

MASTIC ASPHALT DAMPCOURSE.

Approximate Costs—Labour and Materials.

Laid in 2 coats—Horizontal—½ in. thick—12/6 per square yard.
„ „ „ „ „ ¾ in. „ 17/6 „ „ „
Laid in 2 coats—Vertical— ½ in. thick—17/6 „ „ „
„ „ 3 „ „ ¾ in. „ 25/– „ „ „
Contractor to add Profit, etc.

BITUMINOUS FELTS.

Bituminous felts are manufactured in rolls 3 feet wide by 72 feet long, totalling 216 sq. feet, or in rolls 4½ in., 9 in., 13½ in. and 18 in. to suit brickwork. In cottage work these felts are popular dampcourses and may be used under or over windows, porches, hoods, etc.

3 ply is generally used.

EXAMPLES OF COST.

	Per Roll.	Per sq. yd. Cut Pieces
1 Ply	47/6	2/4
2 „	56/3	2/7
3 „	67/3	3/1
5 „	82/–	3/8

DAMPCOURSE FOR BRICKWORK—72 FEET ROLLS.

	4½ in.	9 in.	13½ in.	18 in.	
2 Ply ...	8/6	16/6	—	—	per roll
3 „ ...	9/6	19/–	28/6	38/–	„ „

Approximate Prices per Foot Run Laid.

	4½ in.	9 in.	13½ in.	18 in.
3 Ply	4d.	6d.	8d.	10d.

See Advt., page 8.

LEAD DAMPCOURSE—20 FOOT ROLLS.

	4½ in.	9 in.	14 in.	18 in.	
2 lbs per sq. ft. ...	13/6	26/6	40/–	53/–	per roll.
3 „ „ „ „ ...	20/–	39/9	59/6	84/6	„ „

Approximate Cost Laid—Per Foot Run.

	4½ in.	9 in.	14 in.	18 in.
2 lbs per sq. ft. ...	1/–	2/–	3/–	4/–
3 „ „ „ „ ...	1/4	2/8	4/1	5/3

DAMPCOURSE—LEAD CENTRE—20 FOOT ROLLS.

	4½ in.	9 in.	13½ in.	18 in.	
1 lb. lead ...	13/6	26/6	40/–	53/–	per roll.
2 „ „ ...	20/–	39/9	59/6	84/6	„ „

Other brick width available pro rata.

Approximate Cost Laid—Per Foot Run.

	4½ in.	9 in.	13½ in.	18 in.
1 lb. lead	1/–	2/–	3/–	4/–
2 „ „	1/4	2/8	4/1	5/3

SHEET LEAD—PER TON.

	3 lbs. to 8 lbs.	2½ lbs.	2 lbs. per sq. foot.	
Full Rolls ...	£95 9 3	£96 5 9	£97 4 3	per ton
Cut pieces ...	£98 4 3	£99 0 9	£99 9 3	„ „
Circular or templates ...	£ 101 8 3	£102 5 9	£103 3 3	„ „

Rolls of the following dimensions are supplied at full roll prices: 2 ft. 6 in., 3 ft., 3 ft. 9 in., 5 ft. and 7 ft. 6 in. by either 20 ft. or 30 ft. long.

R.D.M. NON-SLIP COPPER DAMPCOURSE.

Copper dampcourse is everlasting and is impervious to water or damp in any form. R.D.M. copper dampcourse is manufactured with grooves running lengthwise to act as a key to prevent any lateral movement of the dampcourse.

It must be laid in the mortar so that the grooves in the dampcourse can effectively form a key. A minimum lap of 2 in. is required.

Approximate Prices.

4½ in., 1/6 per foot, 9 in. 3/– per foot, 13½ in., 4/6 per foot.

TUBULAR STEEL SCAFFOLDS



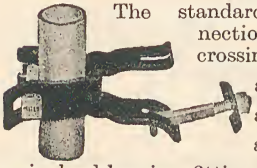
The introduction of Tubular Steel Scaffolding has solved the problem of scaffolding for all types of building construction.

Tubular scaffolding has the advantages over timber of strength, simplicity, speed of erection, interchangeability, absence of fire risk, low weight and bulk factors, economy of costs and complete absence of waste.

While steel scaffolding still retains the original use of any scaffolding, i.e., the provision of platforms or stages to give access to buildings or other structures above ground level, the changeover from timber to steel has enabled many other uses to be developed; and tubular frameworks using patent scaffold clips now provide factory building workshops, garages, water towers, loading banks, foot bridges, jetties, pylons, farm buildings, storage racks, seating banks, grand-stands, fun fair units, concrete formwork, etc. Mobile units on rubber or steel castor wheels are ideal for painters, and decorators engaged on interior work.

STEEL SCAFFOLD FITTINGS:

NINETY-DEGREE CLIP



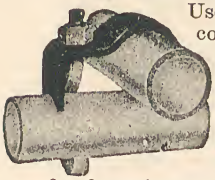
The standard connection for crossing tubes at right-angles and the main load-bearing fitting.

SWIVEL CLIP



The fitting used for connecting tubes at any angle other than 90°, and also for forming lap joints in tubes subject to tensional stress.

PUTLOG CLIP.



Used for light connections at right-angles where the load is fully carried by structural members; e.g., for fastening putlog tubes to ledgers.

END TO END COUPLER.

Used for joining tubes end to end, where subject to compression or little or no tensional stress.



REVEAL PIN.



Used for bridling between window openings on builder's scaffolding and where dead length columns are required.

BASE PLATES.

To carry the bases of columns in all cases where distribution of the load is required.



BLADE-ENDED PUTLOG TUBE.



Used in Bricklayer's scaffolds. Leaves only a small hole when withdrawn from the brickwork.

The two standard types of exterior wall scaffolds are :—

Independent.—(" Heavy " for stonemasons, plasterers, etc.
" Light " for painters.)

This is a structure in itself and stands independently of the walls of the building, except for a few ties through windows.

Putlog (for bricklayers.).—Sometimes called a single scaffold, this construction is joined to the brickwork by blade-ended putlog tubes. These leave only a very small hole to be filled in when the scaffold is dismantled.

Method of estimating.—The most convenient unit for estimating quantities and hire costs of steel scaffolding is the **square,** i.e., an area 10ft. x 10ft. of wall to be covered by the scaffolding ; (e.g., a wall 100ft. long x 50ft. high = 50 squares.).

Approximate Quantities Per Square.

Type of Scaffold	Approximate Material Required per Square	
	Tube	Fittings
Independent (Stonemasons, plasterers)	92ft.	19
Putlog (Bricklayers)	74ft.	14
Independent (Painters)	80ft.	16

For Birdcage Scaffolds, fixed and mobile towers, concrete centring and special structures, actual quantities should be calculated.

Approximate Hire Costs.

A contract price quoted by a Scaffolding firm includes :—
(a) Transport of material to and from the site ;
(b) Labour for erection and dismantling ;
(c) Hire of the scaffold for a minimum period of one month.

After the minimum hire period, a weekly rate is charged which decreases over the next two months.

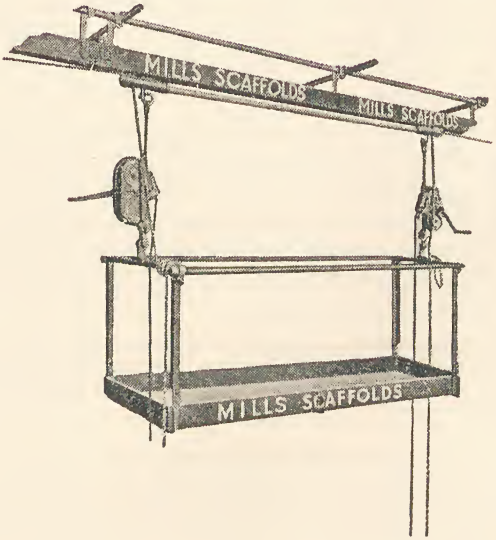
Alternatively, material may be hired by the contractor at a quoted contract price or at standard rates of hire, and the scaffold erected by himself. Or again material, labour, and transport may be used at the standard ruling rates.

Approximate Hire Costs Per Square—Metropolitan Area.

Type of Scaffold	One Month (including Transport to and from Site	for Erection and Dismantling	Costs for First Month	For Second Month Add	Subsequent Months Add
Independent (Stonemasons, plasterers)	19/–	41/–	60/–	10/4	6/1
Putlog (Bricklayers)	14/9	32/9	47/6	7/10	4/9
Independent (Painters)	16/–	35/9	51/9	8/10	5/3

MILLS

TRAVELLING CRADLE



Saves time and cuts rigging costs. The painter can traverse a building horizontally and thus avoid many weary hours of raising and lowering fixed stages.

Many other fittings are available which have been designed to meet practically every possible building need. Complete charts are available from the supplier.

See advertisement on Page 53.

BUSH WORK

MEASUREMENT OF AN ACRE OF LAND.

IN SQUARE ANGLE BLOCKS.

Width	Length	Width	Length	Width	Length	Width	Length
Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
20	2,178	120	363	210	207	320	136
30	1,459	130	336	220	198	340	128
40	1,085	140	312	230	189	360	121
50	875	150	290	240	181	380	114
60	725	160	272	250	174	400	109
70	622	170	250	260	167	450	96
80	545	180	242	270	161	500	87
90	484	190	224	280	155	550	79
100	436	200	218	290	150	600	73

Bush Hardwood Timber.—In choosing trees for sawn timber, posts, slabs, etc., avoid those with dead branches, or hollow pipes, which are often an indication of decay or hollow trunk, when the trees otherwise appear sound.

In **Splitting** H.W. or ironbark, the slabs, posts, etc., are split parallel with the rings, and generally thin out towards the top, but in stringy bark and mess-wood, swamp mahogany, the slabs are generally split in radiating lines from the centre outwards, and in this manner have been split 2 ft. wide by 5 ft. long.

To Test Soundness of Timber. — Place the ear close to one end of the timber while attendant strikes the other end with a hammer. If the sound is ringing and clear, the log is good, but if dull there is some flaw or unsound spot.

TO DESTROY OR CONSUME TREE STUMPS.

Bore a hole with a 2 in. Auger into the stump from the top. Pour a pint of mixture of nitric acid and sulphuric acid, equal parts, and close the hole with a waxed plug. A stump, roots and all, thus treated will be rotten in 30 days.

Another Method.—At the end of summer, into a lin. bored hole, put 2-oz. of saltpetre, fill with 18 in. of water and plug tight. In three months fill the hole with kerosene. When lighted the stump and roots will smoulder away.

PRESERVING HARDWOOD TIMBERS.

By charring and creosoting poles before erection, or after by the use of the oxy-acetylene gas flame to sterilise all insect pests and burn up dry rot. To be followed while warm by an application of creosote, which proves effective for 5 years without further treatment.

TIMBER CUTTING—AXE WORK.

Examples of Cost—Clear Country.

This comprises the felling of trees, lopping and piling up branches for burning.

Green Gum, Stringy Bark or Similar Timber.

12 diam. trees : one tree : one man : 1½ hours at 5/– = 7/6 per tree.
18 diam. trees : one tree : one man : 3 hours at 5/– = 15/– per tree.
2 ft. diam. trees : one tree : one man : 4½ hours at 5/– = 22/6 per tree.

COST PER ACRE—STANDARD TABLE.

For other rates per tree add or deduct percentage of costs.

Distance Apart.	Number of Trees	Cost Per Acre. 12″ diam.	18″ diam.	2 ft. diam.
8	689	£258	£516	£774
10	430	£162	£324	£486
12	325	£120½	£241	£361½
15	200	£75	£150	£225
18	135	£51	£102	£153
20	110	£42	£84	£126
22	70	£27	£54	£81
30	44	£16½	£33	£49½
40	26	£10	£20	£30

THE " HARGANS " PATENTED ONE-MAN MOBILE POWER SAW.

The " Hargans " Mobile Power Saw is invaluable to timber cutters, ideal for cutting mine props, caps, sleepers, firewood, and is specially suitable for general use on farms and stations.

Powered by a 4-cycle, 4½ h.p. engine, it develops approximately 10 h.p. when driving circular saw at required speed of 1,000 revolutions per minute, and is capable of cutting 14″ hardwood logs in 6 seconds, or better.

Easily handled by one man, it is quickly adjustable for vertical, horizontal or diagonal cutting and its approximate weight is 2¾ cwt.

The " Hargans " Saw will take up to a 42″ saw and is mounted on rubber-tyred wheels for easy mobility.

FELLING TREES.

Make the first cut on the leaning side of the tree to safe depth to prevent jamming of saw. When this cut has been completed, the operator takes the saw round to the back of the tree and completes the second cut, i.e., on trees up to 2 ft. in diameter. However, on larger trees it is sometimes necessary to make four or more cuts, remembering always to cut on the leaning side first.

Should the saw jam on a leaning tree, the saw itself will climb out of the cut if not kept in by the operator, and the cut itself can be widened by pressing slightly on the handle bars, thus lifting the saw blade, to widen the existing cut.

It is found that the second cut will always give ample clearance to finish off the first on the leaning side of the tree.

The patented " Gimbal ring " ensures that the blade cuts true to the plane of cut at any angle through an arc of 90 degrees.

See Advertisement, Page 58.

LAND CLEARING AND TIMBER HAULING.

Land Clearing.

The most economical method of timber clearing, particularly when the timber is green, is by a tractor fitted with bulldozer or trail-builder, and wire rope (in conjunction with a tractor winch where grades are met).

The work of green timber clearing poses special problems differing from dead timber clearing. In the latter case, roots and boughs are brittle and trees easily felled.

Green timber calls for a different technique. Growing roots are strong and tough. Green timber is resilient and springy and " shock " methods are less effective. Strong, continuous strain must be exerted on the growing tree to dislodge its grip in the ground.

A Queensland contractor uses an " FD " Oliver Tractor with Britstand hydraulic Trailbuilder for clearing green timber. Majority of trees in a recent job were about 12 in. diameter, with a few up to 4 ft. diameter. Quickest and easiest way to handle the larger trees was with a wire rope (100 yds. of $1\frac{1}{4}$ in. dia.). One end was secured to the butt of a solid tree, the free end passed around the tree to be pulled down (to a height of about 16 ft.) and the rope secured to the tractor drawbar. Most other trees were pushed over by the trailbuilder blade and the timber then "dozed" into windrows for burning off. An area of 30 acres of forest hardwood was cleared at a cost to the owner of £6 per acre. (Hand labour, with a tree-puller, would have cost, it was estimated, £30-£35 per acre). Time of job : 36 hours.

Another Queensland contractor, with the same equipment plus a 4-ton Rooter, cleared 8 acres of heavily-timbered country at Caloundra (Q.) in 40 hours at a total cost to owner of £200. Heavy timber was cleared, stumps, roots and stones removed and the whole area levelled, ripped and cross-ripped ready for harrowing. In this job, one green ironbark 130 ft. high x 4 ft. dia. was pulled down by the tractor with 100 yds. of $1\frac{1}{4}$ inch wire rope. The rope was passed around the trunk at a height of 25 ft.

Dead Timber.

A N.S.W. contractor, using a " DDH " Oliver with Britstand Trailbuilder and 100 yds. of $1\frac{1}{4}$ inch wire rope, has felled over 1,000 acres of dead Blue Mountains hardwood at a daily average of 25 acres and an estimated cost of £1 per acre for pulling and hauling.

Timber Hauling.

Costs vary according to type of timber and country, what roads have to be constructed, distances and grades to the log dumps. As an example, in the Bago State Forest, a number of " DDH " Oliver Tractors with Britstand Trailbuilders have each attained daily haulage output of 20,000 super feet, moving 2,000 sq. ft. lengths of pine and native hardwood distances up to 440 yards, continually clearing their own paths from felling point to log dump.

Timber Hauling.

After felling, trees are broken up into 2,000 sq. ft. logs and hauled by Oliver Tractors to log dumps. For steeper grades, winches are necessary.



Timber Winches.

One is the Britstand WL 101 Winch, made to suit the Oliver "FDE". A super-imposed single-drum P.C.U. (Power Control Unit) can be fitted if required. Line pull is 70,000 lbs.

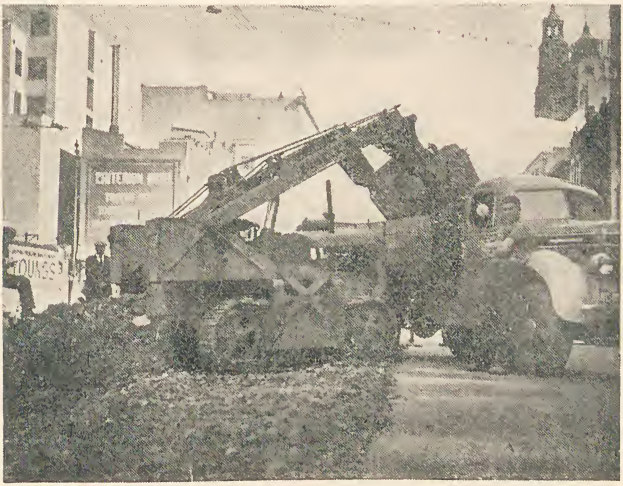
Also :—WL63 Winch (suits Oliver "DDH"). Line pull: 45,140 lbs.

Wire Rope Snotters.

Quick release connections that cost little and mean remarkable savings in time, and in wire rope wear.

Working in Sydney Street.

This Oliver-Britstand Front-End Loader loaded 125 cu. yds. macadam (180 tons) in 12 working hours. A Victorian City Council averaged 500 yds. per day, handling mixed metal and clay aggregate.



See Advertisement, Pages 48 and 49.

RAILWAY SLEEPERS.

Railway Track Sleepers. The best sleepers are those hewn from—

Ironbark (*Eucalyptus paniculata, E. crebra* or *E. siderophloia*).

Grey Gum (*E. propinqua* or *E. punctata*).

Red Gum (*E. rostrata* or *E. tereticornis*).

Grey Box (*E. hemiphloia*).

Tallowwood (*E. microcorys*).

White Mahogany (*E. Acmenioides*).

White Stringybark (*E. eugenioides*).

Yellow Stringybark (*E. muelleriana*).

Woollybutt (*E. longifolia*).

Blackbutt (*E. pilularis*).

The trees should be barked and allowed to die before they are felled, by which means they become partly seasoned. The season for felling Australian timber is from March to September when the sap falls, and it then should be split or sawn and stacked in the shade in such a manner as to afford ventilation ; but with every precaution the ends will open more or less. Sleepers should be stacked with the heart down. The opening of ends may be partly stayed by bolting them or painting ends with whitewash, clay, etc. It would be worse than useless to tar unseasoned timber which would only hasten its decay by preventing the sap evaporating. These remarks apply to all kinds of Australian timber.

CAPACITY OF TANK.

CIRCULAR COR. IRON.
REPUTED CAPACITY.

Diam.		Height of Tank. 4 ft.	5 ft.	6 ft.	8 ft.
ft.	in.	gall.	gall.	gall.	gall.
3	3	200	250	300	400
3	6	240	300	360	480
3	9	280	350	420	560
4	0	310	390	470	620
4	4	—	—	540	720
4	6	—	—	590	787
5	0	—	—	720	960
6	0	—	—	1,050	1,400

SQUARE IRON : 2 ft. 8 in. sq., 100 gall. ; 3 ft. 3 in. sq., 200 gall. ; 3 ft. 8 in. sq., 300 gall. ; 4 ft. sq., 400 gall.

WATER.

1 pint pure water weighs 1¼ lb.
1 gallon pure water contains 277.274 cubic ins.
1 cubic ft. distilled water, 62 deg. Fahr., weighs 62.321 lbs.
1 cubic yard distilled water, 60 deg. Fahr., weighs ¾ ton.
1 cubic fathom distilled water, 62 deg. Fahr. weighs 6 tons.

WINDMILL LIGHTING PLANTS.

These lighting and power plants, operating on winds as low as 5 miles per hour, provide isolated and country homes with cheap electricity for lighting and household appliances. They are supplied as a complete unit with batteries, or as an addition to existing engine-driven plants.

Windlite plants cost nothing to run and require no attention apart from a yearly change of oil. Manufactured in two models.

Model No. 1—32 volt with 1,000 watt capacity.

This model has the capacity, besides lights, of operating electric irons, toasters, pastry mixers, radio, washing machines, vacuum cleaners, electric fans and kettles.

Model No. 2—12 volts with 500 watt capacity.

This model has the capacity, besides lights, for operating radio and fans.

WIND OPERATED LIGHTING SETS.

	£	s.	d.
32 Volt 1,000 Watts—Complete With Switchboard ...	150	0	0
12 Volt 500 ,, ,, ,, ,, ...	95	0	0

STEEL TOWERS.

6 ft. 6 in. Stub Tower...	£7	10	0	30 ft. Tower	30	0	0
20 ft. Tower	£20	0	0	40 ft. Tower	40	0	0
Low Wind Switch ...	£3	10	0	Battery Charger ...	3	10	0
Aerial Wire (per ft.) ...	0	1	0	Installation per Plant	10	0	0
Lighting Points (each)	4	0	0	Power Points (each) ...	4	10	0

All prices for delivery F.O.R. Sydney. Freight, travelling expenses and accommodation on Purchasers' Account.

BATTERIES—POWERPLUS.

32 Volt 27 Plate 280 Ampere Hours	£71	5	0
12 Volt 27 Plate 280 Ampere Hours	£22	5	0
12 Volt 27 Plate 560 Ampere Hours	£44	10	0

Prices Subject to fluctuation. For Current prices and technical advice—See Advertisement, Page 23.

HOW TO ESTIMATE THE QUANTITY OF WATER REQUIRED.

To estimate the quantity of water required daily allow :—

1 gallon per day per head of sheep.

10 gallons per day per head of cattle or horses.

20 gallons per day per head of dairy cattle.

50 gallons per day per person for domestic use ; that is, household purposes, septic tank installations, shower baths, etc., in an average home.

3,000 gallons per day per acre for garden purposes. Thus, if the garden is ¼ of an acre, approximately 800 gallons per day are required. (This is based on providing the equivalent of 1 inch of rain per week over the garden).

Number of Gallons Discharged per Minute through Pipe Lines 1,000 Feet Long.

PART 1.

Head (or Fall) in feet	Discharge in Gallons per Minute International Diameter of Pipe												Head (or Fall) in feet
	½in.	¾in.	1in.	1¼in.	1½in.	2in.	2½in.	3in.	3½in.	4in.	5in.	6in.	
1	·16	·45	·93	1·63	2·57	5·28	9·22	14·5	21·3	29·8	52·1	82·2	1
2	·23	·64	1·32	2·30	3·63	7·46	13·0	20·5	30·1	42·1	73·6	116·0	2
4	·33	·91	1·87	3·26	5·14	10·6	18·4	29·1	42·7	59·6	104·0	164·0	4
6	·40	1·11	2·29	3·98	6·29	12·9	22·5	35·5	52·2	73·0	127·0	201·0	6
9	·49	1·36	2·80	4·88	7·71	15·9	27·7	43·6	64·1	89·5	156·0	246·0	9
12	·57	1·57	3·25	5·64	8·90	18·3	32·0	50·4	74·0	103·0	180·0	285·0	12
16	·66	1·81	3·73	6·51	10·3	21·1	36·9	58·1	85·4	119·0	208·0	329·0	16
20	·74	2·03	4·18	7·28	11·5	23·6	41·2	64·9	95·4	133·0	233·0	367·0	20
25	·82	2·27	4·67	8·14	12·9	26·4	46·1	72·6	106·0	149·0	260·0	411·0	25
30	·90	2·48	5·11	8·92	14·1	28·8	50·5	79·5	116·0	163·0	285·0	450·0	30
40	1·04	2·88	5·91	10·3	16·3	33·5	58·3	92·0	135·0	188·0	329·0	520·0	40
50	1·16	3·21	6·61	11·5	18·2	37·4	65·2	102·0	150·0	210·0	368·0	581·0	50
75	1·42	3·93	8·10	14·1	22·3	45·7	79·9	125·0	184·0	258·0	451·0	712·0	75
100	1·65	4·55	9·35	16·3	25·7	52·8	92·2	145·0	213·0	298·0	521·0	822·0	100
150	2·03	5·59	11·5	19·9	31·5	64·9	113·0	178·0	262·0	366·0	637·0	1011·0	150
200	2·33	6·42	13·2	23·0	36·3	74·6	130·0	205·0	301·0	421·0	736·0	1161·0	200
250	2·61	7·20	14·8	25·7	40·7	83·7	146·0	230·0	337·0	471·0	824·0	1303·0	250
500	3·69	10·20	20·9	36·4	57·5	118·0	206·0	325·0	476·0	667·0	1164·0	1840·0	500

PART 2.

When Pipe Line is more or less than 1,000 feet long, multiply the factor given below by the corresponding number in Part 1 to calculate the correct number of gallons.

Length in feet	50	100	150	200	300	400	500	750	1000	1250	1500
Factor ...	4·47	3·16	2·58	2·237	1·827	1·580	1·414	1·154	1·0	·895	·817
Length in feet	1750	2000	2500	3000	4000	5000	7500	10,000	5mls.	10mls.	50mls.
Factor ...	·756	·707	·633	·577	·500	·447	·365	·316	·195	·138	·0616

Capacities of Round Vessels 1 Foot Deep.

Diameter	Gallons	Diameter	Gallons	Diameter	Gallons	Diameter	Gallons
6in.	1·2	2ft. 2in.	23·	6ft. 3in.	191·2	11ft. 3in.	619·5
7in.	1·7	2ft. 3in.	24·8	6ft. 6in.	206·8	11ft. 6in.	647·3
8in.	2·2	2ft. 4in.	26·6	6ft. 9in.	223·	11ft. 9in.	675·6
9in.	2·7	2ft. 5in.	28·6	7ft. 0in.	239·8	12ft. 0in.	704·8
10in.	3·4	2ft. 6in.	30·6	7ft. 3in.	257·3	13ft. 0in.	827·1
11in.	4·1	2ft. 8in.	34·8	7ft. 6in.	275·3	14ft. 0in.	959·4
1ft. 0in.	4·9	2ft. 10in.	39·3	7ft. 9in.	294·	15ft. 0in.	1101·3
1ft. 1in.	5·7	3ft. 0in.	44·1	8ft. 0in.	313·3	16ft. 0in.	1240·
1ft. 2in.	6·7	3ft. 3in.	51·7	8ft. 3in.	333·1	17ft. 0in.	1406·
1ft. 3in.	7·6	3ft. 6in.	60·	8ft. 6in.	353·6	18ft. 0in.	1575·
1ft. 4in.	8·7	3ft. 9in.	68·8	8ft. 9in.	374·7	19ft. 0in.	1756·
1ft. 5in.	9·8	4ft. 0in.	78·3	9ft. 0in.	396·5	20ft. 0in.	1950·
1ft. 6in.	11·0	4ft. 3in.	88·4	9ft. 3in.	418·8	21ft. 0in.	2148·
1ft. 7in.	12·3	4ft. 6in.	99·1	9ft. 6in.	441·8	22ft. 0in.	2356·
1ft. 8in.	13·6	4ft. 9in.	110·4	9ft. 9in.	465·3	23ft. 0in.	2575·
1ft. 9in.	15·	5ft. 0in.	122·4	10ft. 0in.	489·5	24ft. 0in.	2806·
1ft. 10in.	16·5	5ft. 3in.	134·9	10ft. 3in.	514·3	25ft. 0in.	3044·
1ft. 11in.	18·	5ft. 6in.	148·1	10ft. 6in.	539·6	26ft. 0in.	3294·
2ft. 0in.	19·6	5ft. 9in.	161·8	10ft. 9in.	565·6	27ft. 0in.	3582·
2ft. 1in.	21·2	6ft. 0in.	176·2	11ft 0in.	592·2	28ft. 0in.	3825·

Capacities per Foot of Piping and Casing.

Size of Piping	½in.	¾in.	1in.	1¼in.	1½in.	2in.	2½in.	3in.	3½in.	4in.
No. of Gallons	·012	·022	·038	·064	·083	·124	·244	·340	·449	·577

Size of Casing	4in.	5in.	6in.
No. of Gallons	·477	·765	1·076

WATERBORING PLANTS.

Sub-artesian bores give a permanent water supply free from pollution so common in wells.

Generally speaking, 5 in. bores are used in sheep country and on farms and 6 in. in cattle country to enable suitable size pumps to be inserted, but where salt water is likely to be encountered it is common practice to start off with 6 in. casing and finish with 5 in. so that the salt water can be cased or cemented off.

The Number 2 waterboring plant has a rated capacity of 600 feet for 5 inch or 6 inch holes, but holes up to 1,200 feet have frequently been sunk with this plant.

It is run by a separate engine.

THE PROCESS OF DRILLING.

The No. 2 Waterboring Machine uses the percussion system of drilling. This system of drilling employs a hard steel drill which the machine lifts and drops, giving a series of sharp blows to the formation being drilled. The face of the drill is suitably formed to cut into the earth or rock, and after a certain amount has been drilled it is cleaned out of the hole by a sand pump, which is a length of tubing with a valve in the bottom, after which the drilling is resumed.

The machine should be set up so the sills or frame are not twisted and so that a plumb line from the centre of the drilling pulley in the derrick falls in line with the centre of the base of the derrick. The tools are laid out on the ground, screwed up by hand, and then tightened with the Drill Wrenches.

The tightening up of tools is very important and great care should be taken to ensure this. Clean and oil the threads before and after using.

Hoist the tools until they are hanging from the derrick just clear of the ground. Throw the clutch operating the cable drum out of gear and set the drilling mechanism in motion, and at the same time hold the drill to keep it from swaying. If the drill doesn't hit the ground at the bottom of the stroke let out more cable gradually until it does. Be careful not to let out too much cable else the top of the string will tend to fall over.

About two gallons of water per foot will be needed to keep the hole wet and puddled so that the drillings will come up in the sand pump.

In order to drill a round hole the drill must be constantly turned. It should not strike two successive blows in the same place, and so at the commencement the operator should turn the drill slightly as it comes up after each stroke.

As the hole gets deeper it will be noticed that there is a tendency for the tools to turn themselves. One important thing which must be impressed on the operator's mind is that the drill must be turned constantly and regularly, otherwise the hole won't be round and complications may follow.

The drilling process (if the hole is being started with a drill and not an earth socket) will be continued for four feet or so until the drillings become so thick that the drill won't fall readily in them, when it becomes necessary to draw the tools and clean the hole out with the sand pump. Then go on alternatively drilling and cleaning out.

There should be just enough cable out to let the tools hang clear of the bottom when the machine is stopped. Then, when the machine is running, the spring or stretch of the rope will allow the drill to strike a sharp decisive blow and spring off the bottom without danger of sticking. As the depth increases the distance the drill should hang off the bottom naturally increases since the longer the rope the greater will be the spring.

If the cable is slack, allowing the tools to rest on the bottom, the travel of the drill will be less than that of the beam, with consequent slow progress and the probability of a crooked hole, damaged rope and jars. Another reason for drilling with a taut rope is so that the two halves of the drill jars do not work inside one another while drilling is in progress. Jars should only be used as jars when there is some jarring to be done such as if a drill should become stuck.

This drilling " on the spring of the rope " is the only way to get results.

Whether the rope is too slack is decided by holding the rope; it should vibrate like a taut wire if the feed is correct.

COSTS.

Water Boring Contractors usually charge from 30/- per foot of depth.

No. 2 Waterboring Plant complete with tools and ropes to sink bores for 5″ casing to 600 feet deep.—Approximate Price, £900.

No. 2 Waterboring Plant complete as above to sink bores for 6″ casing to 600 feet deep.—Approximate Price, £940.

WATER MEMORANDA.

Useful Rules and Information.

By doubling the diameter of a pipe or cylinder its capacity is increased four times.

To find the area of a circle or pipe, square the diameter and multiply by ·7854.

To find the circumference of a circle multiply the diameter by 3·1416.

To find the diameter of a circle multiply the circumference by ·3183.

Sharp angles in a pipe line cause a large increase in friction, therefore use bends and easy curves instead of elbows.

A column of water 1 ft. in height exerts a pressure of ·434 lbs. per sq. inch.

One Imperial Gallon of water at 62°F. weighs 10 lbs. and contains 277·464 c. inches.

One Imperial Gallon of Sea Water weighs approximately 10·33 lbs.

One Imperial Gallon of Water equals 1·2 United States Gallons.

One cubic foot of water equals 6¼ imperial gallons.

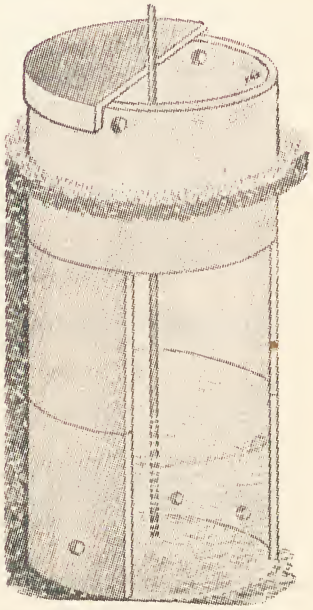
One inch of water over an acre equals 22,700 gallons.

One inch of vacuum is equal to 1·13 ft. To convert inches vacuum to feet suction, multiply by 1·13.

Static Head is the vertical height of a column of water. Head is always expressed in feet.

Friction is the resistance which the walls and irregularities inside pipes offer to the flow of water.

WELL SINKING—REINFORCED CONCRETE WELL LININGS.



HUME REINFORCED CONCRETE WELL LININGS. IN POSITION.

Method of Sinking.

Where the surface soil is firm and solid excavate in the usual manner, using a windlass and bucket to remove the spoil. Carry the excavation down until water is reached, then lower liners into the well. A pump is then applied to keep the water down and enable the well-sinkers to continue excavating until a satisfactory water supply is obtained. The liners placed in position will follow the excavation down, additional lengths for top section being positioned at completion of excavation.

Where rock is encountered it may be necessary to use explosives to penetrate the rock until water is reached. A hammer and drill will be found to be sufficiently effective in boring the necessary holes for blasting. At the completion of excavation the liners are lowered into the well, the bottom one being seated accurately on the rock.

When the well is located in sandy or very loose soil, make a box frame of 9″ x 1½″ timber x 3′ 10″ deep. Sink the box frame to the level of the ground surface and moisten around the sides to prevent sand running down behind the linings and jamming them. Set the first liner inside the box frame and carry on with excavation adding additional lengths as required by the progress of the sinking. Particular care should be taken to ensure that the first and second liners are kept plumb, as it is essential that they be perfectly square and upright for subsequent sections to follow.

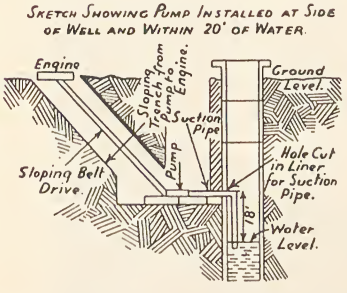
Perforated Lining Pipes.

One or two perforated liners are frequently used for the bottom sections of wells sunk in firm and solid ground.

In rock-bearing country the water invariably makes its access into the well through the bottom, consequently, perforated liners are not necessary where the liners are bedded on a rock bottom.

Method of Lowering Lining Pipes.

Place two timber planks across the mouth of the excavated well and then up-end the first liner into position on these two supports. Attach a chain through the two holes provided in the wall of the liner for that purpose. Erect a sheer legs over the liner in position on the supports. A rope is run through a double pulley and block and then through a triple pulley and block, the triple block being attached to the top of the sheer legs. Height of sheer legs needs to be approximately 13 ft. If available, 1½" diameter piping makes a good sheer legs, or an improvised one made from suitable saplings will be found adequate. Fasten one end of the rope to the chain on the liner and the other end to the front of a car, truck or tractor. Lift the liner off the timber-bearers, withdraw them and lower the liner into the well. Each subsequent length is put into position in the same manner.



Installation of Pumps.

To ensure efficient operation it is well not to exceed a 20 ft. lift for a centrifugal pump. Where the lift is greater than 20 ft. the general practice is to excavate at the side of the well to within approximately 18 ft. of the water and cut a sloping belt drive to the engine or electric motor which is installed at ground level.

Another method is to erect the pump on a staging inside the well itself, approximately 18 ft. above water, and use a perpendicular drive to a pulley on a countershaft at the top of the well. This method is not so universally adopted as the previous one cited.

Irrigation.

Wells are being used extensively as a source of supply for irrigation by spraying. The following information regarding capacity of Heavy Duty pumps will be of interest.

2" dia., 6,000 gals. per hour through 5 chain of piping.
3" dia., 10,000 gals. per hour through 10 chain of piping.
4" dia., 16,000 gals. per hour through 15 chain of piping.
5" dia., 25,000 gals. per hour through 22 chain of piping.

Watering Stock.

The pump in this instance is mainly operated by a windmill, the water being run into Hume reinforced concrete troughing.

WELL LININGS—LIGHT TYPE.
For Transport by Road Only.

Diameter	Wall Thickness	Length	Feet Per ton	Approx. Price per ft.
31″	1½″	4 Feet	13	14/–
37½″	1⅝″	4 ,,	11	19/6
44″	1½″	4 ,,	8	22/–
50½″	1¾″	4 ,,	7	28/6

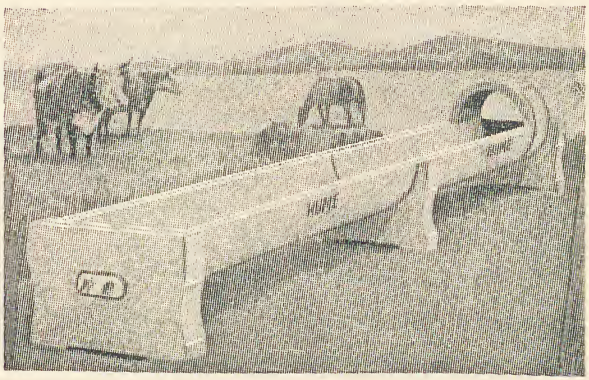
WELL LININGS—HEAVY TYPE.
For Transport by Rail or Boat.

30″	2″	4 Feet	10	16/6
36″	2¼″	4 ,,	7½	21/–
42″	2½″	4 ,,	5¾	27/–
48″	2¾″	4 ,,	4¾	33/–

Add Freight and Cartage.

For Further Information and Quotes See Advertisement, Page 10.

REINFORCED CONCRETE WATER TROUGHS.



Hume reinforced concrete horse, sheep and cattle troughing is centrifugally spun, fire, rust and corrosion resistant and easy to install.

Instructions for Erecting.

Set up the pedestals on a firm foundation, spacing them correctly to ensure a snug fit of the troughing section into the end pedestals, and an even seating on the intermediate pedestals. Sight along the pedestals for accuracy of alignment and trueness of level. Then simply place rubber strips provided on the pedestals and lay the troughing sections in position. Re-check on alignment and level. The water supply can then be connected to the trough. Place the ball valve cover in position, see that scour plug is secure, and the trough is ready for use.

Weight Schedule.

	8 ft.	16 ft.	24 ft.	32 ft.
TROUGH, complete with Pedestals	780 lbs.	1,336 lbs.	1,892 lbs.	2,448 lbs.
BALL VALVE COVER	103 lbs.	103 lbs.	103 lbs.	103 lbs.

Approximate Prices

Standard length of each section, 8 ft. ; inside diameter at top, 18in.

	8 ft.	16 ft.	24 ft.	32 ft.
TROUGH, complete with Pedestals and Rubber Strips	96/11	166/–	237/–	308/8

Extras :—Scour Plug, 32/– ; Ball Valve Cover, 17/6.
Freight and Cartage to be added.
For further information See Advertisement, Page 10.

"NEVERTIRE" AUTOMATIC PRESSURE WATER SYSTEMS.

Model 1909 At—280 galls. per hour capacity.

"Nevertire" Automatic Pressure Water Systems are specially suitable for guest houses, country homes, dairies, etc., usually dependent on slow gravity feeds from tanks or wells. The unit supplies water quickly under pressure and is available in various models according to the gallonage required per hour.

This unit incorporates a totally enclosed self-oiling gearless pump, with V-to-flat drive from an electric motor, and is supplied complete with a galvanised pressure tank, equipped with an automatic air volume control, pressure gauge and pressure switch, and with the fittings to connect the pump to the pressure tank.

Whilst a 240-v. motor is the standard, motors to suit other voltages can be readily substituted. When installed and with all taps turned off, a predetermined pressure is built up in the tank, at which point the pressure switch cuts off the motor. When a tap is opened, and some water drawn off the system, the pressure naturally falls, until, when it reaches a certain point, the pressure automatically starts the motor. The plant keeps pumping until the tap is turned off and the pressure built up again, when the motor is automatically stopped. It will be readily appreciated that the set pressure is always maintained.

The automatic air volume control, a feature of the "Nevertire" System, maintains the correct volume of air in the pressure tank, and the outfit is entirely automatic in operation, needing only periodic maintenance.

Specifications of Standard Units.

	1909AT	V912AMT	V913AMT
Motor H.P.	1/3	1	2
Suction Inlet	1″	1¼″	1½″
Discharge Outlet	¾″	1¼″	1½″
Capacity (Approx.) ...	280 G.P.H.	450 G.P.H.	850 G.P.H.
Operating Pressure (Max.)	20/40 lbs.	60/80 lbs.	60/80 lbs.
Tank Capacity	35 galls.	65 galls.	85 galls.

Larger models built to order.

For further information See Advertisement, Page 59.

DIESEL ENGINES.

AUSTRALIAN-MADE DIESEL ENGINES.

Southern Cross Mark " YB " Type.

Type.

Vertical, fully enclosed, self oiling, compression ignition, solid injection, cold hand starting, single sylinder.

Fuel.

Blended distillates or Fuel Oil. The Southern Cross Diesel Engine is designed, built, tested and warranted to run on Diesel Fuel Oils but will run even better on distillates.

Cooling.

The standard method of cooling is by Thermo-Syphon system with 33 gallon cooling tank and large pipe connections. This size cooling tank is ample where the engine has to run up to 8 hours per day but, if the engine has to run over 8 hours per day, then a 90 gallon cooling tank must be used.

Mark " YB " Southern Cross Diesel Engines.

4 B.H.P. at 1,200 R.P.M.
3 B.H.P. at 900 R.P.M.
at Sea Level and at 62 deg. F.

Price for Standard Engine, including Fuel Tank, 33 gallon Water Cooling Tank (or Hopper), 1 pulley, sufficient oil for one oiling, standard equipment of tools and spares, and an installing and running instruction book.—£137 10s. 0d.

A standard engine for driving milking machines, small generating sets, pump heads, pumps and all machines within its capacity.

Southern Cross " B " Series Diesel Engines.

These " B " Series Diesel Engines are made in sizes of one, two, three or four cylinders. They are all of the vertical, fully enclosed, self-oiling, four cycle, compression ignition, solid injection, cold hand starting type.

Bore and Stroke 4½″ x 5½″. Compression Ratio 16 to 1.
Swept Volume of Cylinders 87·5 cubic inches per Cylinder.
Mark BD-C Type—One Cylinder.

Mark BD-C Southern Cross Diesel Engines.

10 B.H.P. at 1,200 R.P.M.
9·1 B.H.P. at 1,100 R.P.M.
8·3 B.H.P. at 1,000 R.P.M.
7·5 B.H.P. at 900 R.P.M.
at Sea Level and at 62 deg. F.

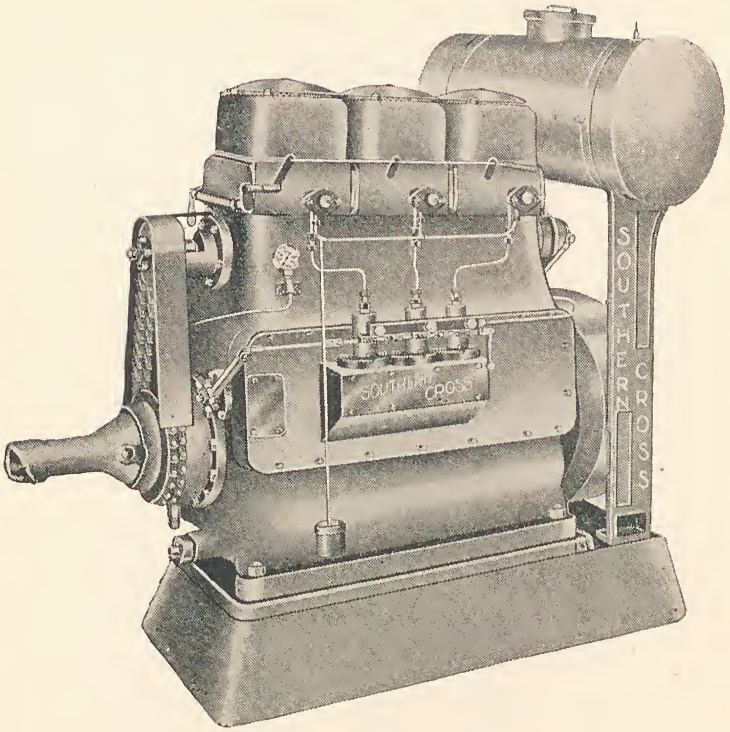
Price for standard engine, including Fuel Tank, 160 gallon Water Cooling Tank, 1 pulley, sufficient oil for one oiling, standard equipment of tools and spares, and an installing and running instruction book. —£191 9s. 6d.

Mark BE-C Type—2 Cylinders.

20 B.H.P. at 1,200 R.P.M.
18·3 B.H.P. at 1,100 R.P.M.
16·6 B.H.P. at 1,000 R.P.M.
15·0 B.H.P. at 900 R.P.M.

Price for Standard Engine, including Fuel Tank, etc., £354.

Mark BF-C Type—3 Cylinders.



Mark BF-C Southern Cross Diesel Engine.

30 B.H.P. at 1,200 R.P.M.
27·5 B.H.P. at 1,100 R.P.M.
25 B.H.P. at 1,000 R.P.M.
22·5 B.H.P. at 900 R.P.M.
at Sea Level and at 62 deg. F.

Price for standard engine, including Fuel Tank, etc., £540.

Mark BG-C Type—4 Cylinders.

Mark BG-C Southern Cross Diesel Engine.

40 B.H.P. at 1,200 R.P.M.
36·6 B.H.P. at 1,100 R.P.M.
33·3 B.H.P. at 1,000 R.P.M.
30 B.H.P. at 900 R.P.M.
at Sea Level and at 62 deg. F.

Price for standard engine, including Fuel Tank, etc., £687 15s. 0d.

CAPACITIES OF ROUND GRAIN TANKS OR SILOS.

In Bushels of Wheat.

Height of Silo	Diameter of Silos in feet.			
	10 feet.	12 feet.	14 feet.	16 feet.
30	1893	2726	3710	4846
32	2019	2908	3958	5169
34	2145	3089	4205	5492
36	2272	3271	4452	5815
38	2398	3453	4700	6138
40	2524	3634	4947	6461
42	2650	3816	5194	6784
44	2776	3998	5442	7107
46	2903	4180	5689	7431
48	3029	4361	5936	7754
50	3155	4543	6184	8077
52	3281	4725	6431	8400
54	3407	4907	6678	8723
56	3534	5088	6926	9046
58	3660	5270	7173	9369
60	3786	5452	7420	9692
62	3912	5633	7668	10015
64	4038	5815	7915	10338
66	4165	5997	8162	10661
68	4291	6179	8410	10984
70	4417	6360	8657	11307
72	4543	6542	8905	11630
74	4669	6724	9152	11953
76	4796	6906	9399	12277
78	4922	7088	9645	12599
80	5048	7270	9891	12921
82	5174	7452	10137	13243
84	5300	7634	10383	13565
86	5426	7816	10629	13887
88	5552	7998	10875	14209
90	5678	8180	11121	14531
Bushels per foot of height	63	90	123	161
Deduct for Hoppered Bottom	160	281	445	661

CAPACITIES OF ROUND GRAIN TANKS OR SILOS.

In Bushels of Wheat.

Height of Silo	Diameter of Silos in feet.			
	18 feet.	20 feet.	22 feet.	24 feet.
36	7360			
38	7769			
40	8178	10096		
42	8586	10600	12827	
44	8995	11105	13438	15962
46	9404	11610	14048	16719
48	9813	12115	14659	17446
50	10222	12620	15270	18172
52	10631	13125	15881	18899
54	11040	13629	16492	19626
56	11449	14134	17102	20353
58	11858	14139	17713	21080
60	12266	15144	18324	21807
62	12675	15649	18935	22534
64	13084	16153	19546	23261
66	13493	16658	20156	23988
68	13902	17163	20767	24715
70	14311	17668	21378	25441
72	14720	18172	21989	26168
74	15129	18677	22599	26895
76	15537	19182	23210	27622
78	15945	19686	23820	28348
80	16353	20190	24430	29034
82	16761	20694	25040	29800
84	17169	21198	25650	30526
86	17577	21702	26260	31252
88	17985	22206	26870	31978
90	18393	22710	27480	32704
Bushel per foot of height	204	252	305	363
Deduct for Hoppered Bottom	904	1284	1723	2232

Pitch of Hoppered Floor, 37½ Degrees.

BUILDERS' CONTRACT PRICES

INCLUDES PROFIT AND " ONCOSTS " WHERE APPLICABLE.

ITEM.	UNIT	RATE £ s. d.
Excavator.		
Excavation to 3 feet deep in soil on surface ...	Cu. Yd.	1 7 0
,, ,, ,, ,, ,, clay ,, ,, ...	,,	1 15 6
,, ,, ,, ,, ,, shale ,, ,, ...	,,	2 12 0
Excavation to 3 feet deep in soil in trenches ...	,,	1 12 0
,, ,, ,, ,, ,, clay ,, ,, ...	,, ,,	2 5 0
,, ,, ,, ,, ,, shale ,, ,, ...	,, ,,	2 16 0
Excavation to 1 foot deep in rock	,, ,,	7 10 6
Levelling and scabbling in rock	Per sup. ft.	7 0
Loading and Carting soil to 2 miles	Cu. yd.	10 0
Remove soil and spread on site	,, ,,	8 0
Drainer.		
4″ G.E.W. 1st quality in trenches to 2 feet deep, including excavation, laying, jointing and filling in, for sewerage	Lin. Ft.	7 6
4″ G.E.W. 2nd quality in trenches to 2 feet deep, including excavation, laying, jointing and filling in, for sewerage	,, ,,	7 0
6″ G.E.W. 1st quality in trenches to 3 feet deep, including excavation, laying, jointing and filling in, for sewerage	,, ,,	9 0
6″ G.E.W. 1st quality bends—extra only ...	Each	9 0
6″ G.E.W. 1st quality Inspection pipes—extra only	,,	12 6
4″ G.E.W. 1st quality bends—extra only ...	,,	6 6
4″ G.E.W. 1st quality Inspection pipes—extra only	,,	10 0
4″ G.E.W. 1st quality P. traps—extra only ...	,,	11 6
6″ G.E.W. 1st quality Gulley—extra only ...	,,	15 0
8″ G.E.W. 1st quality Gulley—extra only ...	,,	19 0
8″ Cast Iron Grate—extra only	,,	3 9
10″ Cast Iron Grate—extra only	,,	4 9
4″ G.E.W. 2nd quality Stormwater drains ...	Lin. Ft.	5 6
4″ G.E.W. 2nd quality bends—extra only ...	Each	6 6
Concretor.		
Raft bases to columns in 5:2½:1 mix	Cu. yd.	6 10 0
Concrete 4:2:1 mix in footings	,, ,,	6 17 0
Concrete 4:2:1 mix in multiple floors, 6″ thick ...	,, ,,	7 18 0
Concrete paths, 3′–0″ wide 4″ thick	Sup. yd.	1 4 0
,, ,, 2′–0″ ,, 3″ ,, ...	,, ,,	1 0 0

ITEM.	UNIT	RATE £ s. d.
Formwork.		
Approved timber formwork to floors	100 sup ft.	8 2 0
,, ,, ,, to beams, lintels ...	,, ,,	9 5 0
,, ,, ,, to stairs	,, ,,	11 12 0
Reinforcement.		
⅜″—¾″ dia. round mild steel	Per cwt.	2 7 0
688 Fabric reinforcement	Sup. yd.	2 9
Pavior.		
Cement render to pavings ½″ thick	,, ,,	6 6
,, ,, ,, ¾″ ,, ...	,, ,,	8 6
,, ,, ,, 1″ ,, ...	,, ,,	10 6
Tiler—Wall and Floor.		
6″x6″ Cream Wall tiles fixed	,, ,,	2 17 9
6″x6″ Coloured Wall Tiles	,, ,,	3 13 0
6″x6″ Coloured Wall Tiles—roundage extra to yardage	Lin. ft.	1 6
Decorative strips	,, ,,	1 9
Cappings, Angle Beads	,, ,,	1 9
4″x4″ Coloured Wall Tiles Fixed	Sup. yd.	3 14 0
6″x1¼″ Cream Cove Tiles	Lin. ft.	2 0
6″x2″ Cream Cove Tiles	,, ,,	2 6
2″x1″ Moravian floor tiles—fixed	Sup yd.	2 8 6
2″x2″ Moravian floor tiles—fixed	,, ,,	2 10 0
2″x2″, 4″x4″ Vitreous	,, ,,	2 19 9
¾″x¾″ Mosaic floors—fixed	,, ,,	3 6 6
6″x6″ Cream Soapholder with grip—fixed ...	Each	1 10 0
6″x3″ Cream Soapholder with grip—fixed ...	,,	1 0 3
6″x3″ Cream Ventilators—fixed	,,	9 6
Terrazzo.		
1″ thick paving large areas in ordinary cement ...	Sup. yd.	2 2 0
2″ radius floor coving	Lin. ft.	6 6
Thresholds to 5 feet long rounded on front and returned ends—1½″ thick	,, ,,	7 6
Partitions 1¾″ thick, 6 feet high	Sup. ft.	13 0
Extra for piercing for door hinges, etc.	Per door	12 9
Extra for chrome plated brackets	Per pair	12 6
Smith and Ironfounder.		
Steel window frames (unglazed) domestic ...	Sup. ft.	8 6
Steel balustrade to stairways	Lin. ft.	1 10 0
Pipe framed single gates, 3′–0″ wide ...	...Each from	3 10 0
Pipe framed double gates, 9′–0″ wide	,, ,,	7 10 0
Wrought iron single gates, 3′–0″ wide	,, ,,	3 10 0
Wrought iron double gates, 9′–0″	,, ,,	7 10 0

ITEM	UNIT	RATE £ s. d.
Bricklayer.		
Common brickwork in compo mortar	Per 1,000	27 6 0
Common brickwork in cement mortar	,, ,,	28 12 0
Extra only over above for face bricks including joints and cleaning down	Sup. yd.	9 0
Dampcourse lead 2 lb.—4½″ wide	Lin. ft.	2 0
,, ,, 3 lb.—4½″ wide	,, ,,	2 6
,, Bituminous 3 ply—4½″ wide ...	,, ,,	8
Partitions.		
Terra cotta air vents, square hole, 9″x6″ ...	Each	2 9
,, ,, ,, louvred, 9″x6″	,,	3 0
,, ,, Lumber 3″ thick	Sup. Yd.	16 0
,, ,, ,, 4″ thick	,, ,,	19 0
,, ,, ,, 6″ thick	,, ,,	1 4 0
Cokebreeze partition blocks 2″	,, ,,	15 0
,, ,, ,, 3″	,, ,,	16 6
,, ,, ,, 4″	,, ,,	19 0
,, ,, ,, 6″	,, ,,	1 6 0
Fencing :		
5 f high Paling fence (sub-contractor) ...	Lin. ft.	7 0
6 ft. high Paling fence (sub-contractor) ...	,, ,,	7 6
3 ft. high Front fence	,, ,,	6 0
3 ft. high Park rail fence	,, ,,	6 0
3/16″ Asbestos cement to external walls	Sup. yd.	7 6
,, ,, ,, ,, ceilings	,, ,,	8 6
3/8″ Fibrous plaster to internal walls	,, ,,	6 6
½″ ,, ,, ,, ,, ,, ...	,, ,,	7 6
3/8″ ,, ,, to ceilings including Battens	,, ,,	10 9
½″ ,, ,, ,, ,, ,, ,,	,, ,,	12 6
Cornice per inch of girth	Lin. ft.	1 (min. 6d.)
Floor sanding, wax and polish	Per Sq.	2 1 6
,, ,, only	,, ,,	1 8 6
Parquetry floor, tallow-wood	Sup. yd.	2 7 6
Joiner.		
3″x2″ Maple handrail, polished	Lin. ft.	19 0
6′–8″ x 2′–8″ Hollow core stock doors 1½″ thick	Each	3 15 0
,, ,, ,, ,, ,, ,, 1¾″ thick	,,	5 10 0
,, ,, Ledged and braced stock doors ...	,,	5 0 0
4′–3″ x 3′–1½″ Box frames only	,,	4 10 0
4′–3″ x 2′–0″ Casement frames only	,,	3 10 0
Sashes for above box frames 1¾″ Unglazed ...	Per pair	2 10 0
Sashes for above casement frames 1½″ Unglazed	Each	1 10 0
4″ Architraves, Oregon	100 Lin. ft.	6 3 0
2″ Picture Rail Oregon	,, ,,	3 13 0
1″ Quadrant, Oregon	,, ,,	2 8 6
6″ x 1″ Fascia to eaves—single storey	,, ,,	8 15 0

ITEM	UNIT	RATE £ s. d.
Roofer.		
5 Ply Malthoid Single Layer	Sup. Yd.	8 0
26 g. Corrugated Iron	Per Sq.	6 17 0
Semi-glazed terra cotta tiles	,, ,,	7 8 4
Cement roof tiles	,, ,,	7 12 6
Std. Asbestos cement roofing	,, ,,	6 14 0
Deep ,, ,, ,, ...	,, ,,	7 0 6
Std. Fluted 2 piece asbestos cement ridging ...	Lin. ft.	3 9
Deep Fluted 2 piece asbestos cement ridging ...	,, ,,	3 9
Labour in cutting and waste to A.C. roofing ...	,, ,,	9
Plumber.		
26 g. Galv. iron ridging	Lin. ft.	2 3
,, ,, ,, gutter, $4\frac{1}{2}$″ quad.	,, ,,	3 9
,, ,, ,, downpipe 3″ dia.	,, ,,	3 3
,, ,, ,, ,, 4″ ,, ...	,, ,,	2 6
Asbestos cement gutter 5″ quad.	,, ,,	3 6
,, ,, downpipe 3″ dia.	,, ,,	3 3
Galv. Iron piping $\frac{1}{2}$″ dia.	,, ,,	2 9
,, ,, ,, $\frac{3}{4}$″ ,, ...	,, ,,	3 0
,, ,, ,, 1″ ,, ...	,, ,,	3 3
,, ,, ,, $1\frac{1}{4}$″ ,, ...	,, ,,	3 4
,, ,, ,, $1\frac{1}{2}$″ ,, ...	,, ,,	3 9
Bitulynd piping $\frac{1}{2}$″ ,, ...	,, ,,	3 9
,, ,, $\frac{3}{4}$″ ,, ...	,, ,,	4 3
,, ,, 1″ ,, ...	,, ,,	5 4
$1\frac{1}{32}$ x 13 g. Copper piping to main	,, ,,	10 6
Plasterer.		
$\frac{3}{4}$″ thick cement render and set	Sup. yd.	7 0
$\frac{1}{2}$″ ,, ,, ,, steel trowelled	,, ,,	5 9
$\frac{3}{4}$″ ,, ,, ,, ,, ,, ...	,, ,,	6 9
1″ ,, ,, ,, ,, ,, ...	,, ,,	7 6
Painter.		
Roofs :—Corr. Iron—one coat	,, ,,	3 0
,, ,, ,, two coats	,, ,,	4 3
,, ,, ,, Underside one coat	,, ,,	3 0
,, ,, ,, ,, two coats	,, ,,	4 3
3 coat oil paint to plain woodwork	,, ,,	6 4
3 coats new cement walls	,, ,,	6 2
3 coats oil paint to internal woodwork	,, ,,	6 4
4 coats oil paint to internal woodwork	,, ,,	7 6
Cleaning off old work	,, ,,	9
Burning off old work	,, ,,	1 9
Stain and 2 coats varnish	,, ,,	6 2
2 coats Kalsomine	,, ,,	3 0
$\frac{1}{2}$″–1″ wide lines	Lin. ft.	4
French Polish	Sup. ft.	2 9

BUILDING BOARDS AND WALL LININGS

MASONITE.

THE WONDER BOARD OF 1000 USES.

Masonite Boards are made entirely from Australian hardwoods exploded into fibres and then pressed into sheets. Masonite is genuine wood—nothing else. No form of artificial binder is added, the natural binding agent of the wood, lignin, and the action of steam and pressure on the exploded fibres converts the timber into Steel-strong, satin-smooth, hardboard.

SPECIFICATION OF CRATES OF 12′ x 4′ SHEETS.

All prices subject to 2/6 surcharge per 100 sq. feet.

Thickness	No. of Sheets	Cubic feet.	Average Weight in lbs.	Sq. Ft.	Av. Wt. per sq. ft. in lbs.	Retail Price per 100 sq. ft.
		Presdwood.				
1/8″	12	10·0	495	576	·79	28/6
3/16″	10	10·0	510	480	·98	36/3
1/4″	8	10·0	551	384	1·34	45/6
5/16″	6	10·0	535	228	1·73	55/–
		Tempered Presdwood.				
1/8″	12	10·0	535	576	·86	46/3
3/16″	10	10·0	558	480	1·08	55/6
1/4″	8	10·0	589	384	1·43	63/9
5/16″	6	10·0	553	288	1·79	74/–
		Temprtile.				
3/16″	10	10·30	573	480	1·12	55/6
		Primecote.				
3/16″	10	10·0	—	480	—	42/6
		Concrete Formboard.				
1/4″	8	10·0	578	384	1·40	75/9

TERMITE RESISTANT BOARD.

All thicknesses in Presdwood and Tempered Presdwood available.

Prices :—7/6 per 100 sq. feet extra on Presdwood and Tempered Presdwood prices.

Masonite Presdwood which combines the qualities of wood with rugged strength and toughness, makes it specially suitable for panelling, cupboards, furniture and interior work generally.

Masonite Tempered Presdwood is Presdwood which has been specially heat-treated with oils for a long period in kilns to give it added strength, toughness and resistance to water. It is especially adaptable for exterior application, floor coverings, table tops and many important industrial applications.

Masonite Temprtile.—This is Tempered Presdwood into which four-inch squares have been pressed giving the appearance of ceramic tiles, but costing far less. Temprtile is at home in kitchens, bathrooms, laboratories, bars or restaurants, where, when painted, it presents a gleaming surface which is impervious to water.

Primecote is Standard Presdwood which has been treated with one coat of special water base primer which is designed as a base to which any further finishing coats can be applied.

Masonite Concrete Formboard is a smooth surfaced, compressed fibre board, dense, impervious to water, tough and durable, tempered by a special process to make it ideally suited for concrete forming.

Concrete Formboard not only ensures better Concrete but also effects substantial economies, as there are numerous instances in which these boards have been re-used upwards of twenty times.

Termite Resistant Masonite has greater resistance to termite and borer attack than Cypress Pine. This protection is the result of years of experiment backed by rigorous tests carried out by the Commonwealth and Industrial Research Organisation.

This treatment is available in all thicknesses of both Presdwood and Tempered Presdwood.

Important.

The manufacture of Masonite necessitates the application of great heat and pressure. The finished Masonite boards are therefore in their driest possible state. If applied whilst in this condition, they may tend to wave or buckle when subjected to any increased atmospheric moisture. This may be overcome by thoroughly wetting the screen side and brushing the water in with a stiff broom. They should then be stacked flat, back to back, and allowed to lie in a wet condition for at least 24 hours before application.

General Instructions for Applying Masonite :

These may be obtained on request from the Masonite Sales Office. The services of a Technical Officer are available to assist at all times with any problems and supply technical data where required.

See Advertisement, Page 2.

FACT-O-TILE SHEETS.

Fact-o-Tile sheet tiling is a plastic product, manufactured in sheets for the tiling of bathrooms, kitchen walls, shops, etc.

Available in cream and pastel green.

Sizes of Sheets.—In 4″ or 6″ Square Tile Pattern—6′ x 4′4″—8′ x 4′4″—6′ x 4′6″—8′ x 4′6″.

Price.—21/6 per square yard.

Metal Cover Strips, Angles, Capping.—9d. per foot.

CANE-ITE.

" Cane-ite " is a cellulose fibre board for interior walls and ceilings, having considerable value as an insulating board against sound and heat. It is light in weight and easy to fix.

Two types, " Standard " and " Ivory " for interior finishes, are obtainable in $\frac{1}{2}$" thickness, 3 ft. or 4 ft. widths and 6 ft. to 12 ft. lengths.

A special low density " Cane-ite " is obtainable for refrigeration purposes in 1", 2", 3" and 4" thicknesses.

APPROXIMATE PRICES—Per 100 sq. feet.

		£	s.	d.	
Standard Cane-ite	$\frac{1}{2}$" thick ...	2	1	9	Per 100 sq. feet.
Ivory ,,	$\frac{1}{2}$" ,, ...	2	9	3	,, ,, ,, ,,
Low Density ,,	1" ,, ...	3	15	9	,, ,, ,, ,,
,, ,, ,,	2" ,, ...	8	6	9	,, ,, ,, ,,
,, ,, ,,	3" ,, ...	12	18	0	,, ,, ,, ,,
,, ,, ,,	4" ,, ...	17	19	0	,, ,, ,, ,,

Minimum Cartage 5/- per 100 sq. feet.

ACOUSTI-TILE.

Cane-ite Acousti-Tile is a light, rigid fibre tile one foot square, $\frac{3}{4}$ inch thick, combining sound-absorbing efficiency, with a durable and re-paintable smooth ivory finished surface. The face is mechanically perforated with 484 holes about $\frac{3}{16}$-inch diameter extending into the sound-absorbing material. These numerous perforations act as cylinders, allowing the sound-waves access to the porous interior of the tile where sound absorption takes place.

Price 2/- per square foot. Approx. price fixed 3/- sq. foot.

" GYPROCK " GYPSUM WALL BOARD.

" Gyprock " is a wall and ceiling board with a fire-resistant core of gypsum. The gypsum rock core is pulverized, calcined, processed and sandwiched between tough layers of 7-ply liner. The " Gyprock " is surfaced to an ivory face specially treated to take any form of decoration.

The back of " Gyprock " is sized to resist moisture.

It is fire resistant and termite proof.

Price, 51/6 per 100 sq. ft.; Cartage, 1/3 per 100 sq. ft.; Labour Fixing—Walls, 20/-; Ceilings, 30/- per square.

HARDBOARD.

Standard Thickness $\frac{3}{16}$"—44/9 per 100 sq. feet—ex Distributors.

JOINT COVER STRIP.

For covering the joints of Asbestos-Cement sheets, plaster boards, masonite, and similar interior wall lining and ceiling boards, " Anaglypta " joint cover strip, a strong paper strip 2" wide with a series of small longitudinal corrugations that act as an expansion joint, is available in rolls of 100 lin. ft. at 10/3 per roll.

For supplies refer to advertisement on inside front cover.

ASBESTOS CEMENT SIDINGS—FOR EXTERNAL WALLS.

Manufactured in natural cement colour, embossed with cedar graining on the exposed surface.

The sidings are 24″ x 12″ deep with nail holes punched ready for fixing to battens.

Fixing.—The bell cast batten at the bottom to be 3″ x 1¼″, diminished to 1⅛″ at top and nailed to studs ½″ above the finishing line of the bottom sidings. The second batten is fixed with its centre line 11″ above the bottom edge of the bellcast batten. The remaining battens fixed at 10½″ centres.

Fix an underlay of bitumastic felt over the entire surface, after battens are fixed, commencing at the bottom and lapping 6″ at all horizontal laps. The felt to be stretched to eliminate sagging. Commence each alternate course with a half siding to break the joints. Punch two new nail holes to fix the half sidings.

The vertical joints are butt jointed with weather strips fixed underneath.

External Angles finished with either galvanized iron or wooden mouldings.

Internal Angles are scribed to butt at alternate courses.

Sidings to lap 1½″ at horizontal joints.

Packed in bundles of 20—16/– Bundle plus 50% surcharge.

Weather strips 12″ x 3″—12/9 per 100. One bundle covers 35 square feet.

NETT COST—PER SQUARE.

Battens and underlay not included.

	£	s.	d.
3 Bundles at 16/– per bundle	2	8	0
Add 50 per cent. surcharge	1	4	0
60 Weather Strips at 12/9 per hundred ...		7	6
Nails		2	6
Labour Fixing, 5 hours at 6/–	1	10	0
Nett Cost Per Square	£5	12	0

Add Corner Mould, Cartage, Oncosts and Profit.

LAMINEX.

Laminex is a hard and durable plastic surfacing board, used for wall panelling, counters, table tops, furniture and fittings. It is impervious to moisture and consequently used in hotels, cafes, hospitals, bathrooms, kitchens and for many decorative purposes in furniture.

Range of Colours.

Grey Crash.	Oriental Walnut.
Natural Cedar.	Blue.
American Walnut.	Brown Birch Bark.
Green Marble.	Black Marble.
Grey Linen Fine Weave.	Tan Linen Fine Weave.
Red Linen Fine Weave.	Red Linen Coarse Weave.
Red.	Grey Birch Bark.
Grey Cedar.	Bleached Mahogany.
Red Pearl.	Blue Pearl.
Blue Linen Coarse Weave.	Blue Linen Fine Weave.
Brown Linen Coarse Weave.	Green.
Cream.	Black.

Size of Sheets—8 ft. x 4 ft. x $\frac{1}{16}$″ thick.—Price £9 7 0 per sheet.

CARPENTER

MEASUREMENT.

Timber is generally measured by the 100 feet super.

The superior kinds, such as cedar, mahogany, rosewood, Tasmanian blackwood, veneers, and joinery, &c., by the super foot.

The labour is by the 100 feet square of piecework, such as studs, battens, shingle, T. and G. and other partitions, joisting and flooring, framing, roofing, ceiling, and weatherboards.

It will be a saving of time when estimating to form cost price per square (locally), including allowance for waste on lengths.

Round timbers, for **woolsheds, stockyards,** corner posts, telegraph poles, by the piece.

Bridge and small wharf piles are by the pole or single piece.

Larger piles, over a foot in diameter, struts and beams, by cub. foot.

Ceiling, slate, and wall battenings, by the 100 square feet, viz., 10ft. x 10ft.

Rules for Measurement.

The Surface work of joinery, per super. foot is accentuated by every angle or determination, according to frequency.

Circular work of every description in Joinery to be charged as follows, viz. :—

Flat Sweep, not more than ½-inch rise per foot, or curves of circles not less than 3 feet diameter, once and a half the price of straight work.

Quick sweep or Elliptical, or more than ½-inch rise per 12-inch chord, twice the price of similar straight work ; the same, according to sharpness of the curves.

The above proportions apply to the shape on the plan or to the elevation only.

If they occur on both plan and elevation as circular, they must be reckoned twice or three times the price of circular on plan only, e.g., if flat sweep on both plan and elevation, the proportion would be $1\frac{1}{2} \times 2 = 3$ times the price of straight work.

If quick sweep on both plan and elevation, the proportion would be $2 \times 3 = 6$ times the price of similar straight work.

If flat sweep on plan and quick in elevation, $4\frac{1}{2}$ times.

If quick sweep on plan, and flat in elevation, 4 times the price of similar straight work.

Measurement—Carpenter and Joiner.

Circular sashes, frames, shutters, &c., to be measured square, and circular heads to doors, &c., to be measured square above the springing, which gives an addition of 21½ per cent. on the net measurement, exclusive of the extra charge determined by the previous Rules.

Circular, plain glued in thickness, for all degrees of curvature take twice the price of similar straight solid work, and if circular from 3 to 4 times, according to sharpness of curves.

TIMBER MERCHANTS' TABLE OF BOARDS.

To find the Superficial Contents of **One inch Boards** of different widths.

Boards. Size in inches.	Length of Board in Feet. 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3 ...	1·3	1·6	1·9	2·0	2·3	2·6	2·9	3·	3·3	3·6	3·9	4·0	4·3	4·6	4·9	5·0
4 ...	1·8	2·0	2·4	2·8	3·0	3·4	3·8	4·	4·4	4·8	5·0	5·4	5·8	6·0	6·4	6·8
5 ...	2·1	2·6	2·11	3·4	3·9	4·2	4·7	5·	5·5	5·10	6·3	6·8	7·1	7·6	7·11	8·4
6 ...	2·6	3·0	3·6	4·0	4·6	5·0	5·6	6·	6·6	7·0	8·6	8·0	8·6	9·0	9·6	10·0
7 ...	2·11	3·6	4·1	4·8	5·3	5·10	6·5	7·	7·7	8·2	8·9	9·4	10·11	10·6	11·1	11·8
8 ...	3·4	4·0	4·8	5·4	6·0	6·8	7·4	8·	8·8	9·4	10·0	10·8	11·4	12·0	12·8	13·4
9 ...	3·9	4·6	5·3	6·0	6·9	7·6	8·3	9·	9·9	10·6	11·3	12·0	12·9	13·6	14·3	15·0
10 ...	4·2	5·0	5·10	6·8	7·6	8·4	9·2	10·	10·10	11·8	12·6	13·4	14·2	15·0	15·10	16·8
11 ...	4·7	5·6	6·5	7·4	8·3	9·2	10·1	11·	11·11	12·10	13·9	14·8	15·7	16·6	17·5	18·4
12 ...	5·0	6·0	7·0	8·0	9·0	10·0	11·0	12·	13·0	14·0	15·0	16·0	17·0	18·0	19·0	20·0
13 ...	5·5	6·6	7·7	8·8	9·9	10·10	11·11	13·	14·1	15·2	16·3	17·4	18·5	19·6	20·7	21·8
14 ...	5·10	7·0	8·2	9·4	10·6	11·8	12·10	14·	15·2	16·4	17·6	18·8	19·10	21·0	22·2	23·4
15 ...	6·3	7·6	8·9	10·0	11·3	12·6	13·9	15·	16·3	17·6	18·9	20·0	21·3	22·6	23·9	25·0
16 ...	6·8	8·0	9·4	10·8	12·0	13·4	14·8	16·	17·4	18·8	20·0	21·4	22·8	24·0	25·4	26·8
17 ...	7·1	8·6	9·11	11·4	12·9	14·2	15·7	17·	18·5	19·10	21·3	22·8	24·1	25·6	26·11	28·4
18 ...	7·6	9·0	10·6	12·0	13·6	15·0	16·6	18·	19·6	21·0	22·6	24·0	25·6	27·0	28·6	30·0
19 ...	7·11	9·6	11·1	12·8	14·3	15·10	17·5	19·	20·7	22·2	23·9	25·4	26·11	28·6	30·1	31·8
20 ...	8·4	10·0	11·8	13·4	15·0	16·8	18·4	20·	21·8	23·4	25·0	26·8	28·4	30·0	31·8	33·4
21 ...	8·9	10·6	12·3	14·0	15·9	17·6	19·3	21·	22·9	24·6	26·3	28·0	29·9	31·6	33·3	35·0
22 ...	9·2	11·0	12·10	14·8	16·6	18·4	20·2	22·	23·10	25·8	27·6	29·4	31·2	33·0	34·10	36·8
23 ...	9·7	11·6	13·5	15·4	17·3	19·2	21·1	23·	24·11	26·10	28·9	30·8	32·7	34·6	36·5	38·4
24 ...	10·0	12·0	14·0	16·0	18·0	20·0	22·0	24·	26·0	28·0	30·0	32·0	34·0	36·0	38·0	40·0

Table Converting Square Posts and Beams to Superficial Measure.

Length in feet.

Size Scantling.	8	9	10	11	12	14	16	18	20	26	100
4 x 4	10·8	12·0	13·4	14·8	16·	18·8	21·4	24·0	26·8	34·8	134·
5 x 5	16·8	18·9	20·10	22·11	25·	29·2	33·4	37·6	41·8	54·2	209·
6 x 6	24·0	27·0	30·0	33·0	36·	42·0	48·0	54·0	60·0	78·0	300·
7 x 7	32·8	36·9	40·10	44·11	49·	57·2	65·4	73·6	81·8	106·2	409·
8 x 8	42·8	45·6	53·4	58·8	64·	74·8	85·4	96·0	106·8	138·8	534·
9 x 9	54·0	60·9	67·6	74·3	81·	94·6	108·0	121·6	135·0	175·6	675·
10 x 10	66·8	75·0	83·4	91·8	100·	116·8	133·4	150·0	166·8	216·8	834·
11 x 11	80·8	90·9	100·10	110·11	121·	141·2	161·4	181·6	201·9	283·9	1009·
12 x 12	96·0	108·0	120·0	132·0	144·	168·0	192·0	216·0	240·0	312·0	1200·
14 x 14	130·8	147·0	163·4	179·8	196·	228·8	261·4	294·0	326·8	424·8	1634·

Table Converting Floor, Roof and Stud Scantlings to Superficial Measure.

Length in Feet.

Size of scant'g	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2 x 1½	1·3	1·6	1·9	2·	2·3	2·6	2·9	3·0	3·3	3·6	3·9	4·	4·3	4·6	4·9	5·0
3 x 1½	1·11	2·3	2·8	3·	3·5	3·9	4·2	4·6	4·11	5·3	5·8	6·	6·4	6·8	7·2	7·6
4 x 1½	2·6	3·0	3·6	4·	4·6	5·0	5·6	6·0	6·6	7·0	7·6	8·	8·6	9·0	9·6	10·0
5 x 1½	3·2	3·9	4·5	5·	5·8	6·3	6·11	7·6	8·2	8·9	9·5	10·	10·8	11·3	11·9	12·6
6 x 1½	3·9	4·6	5·3	6·	6·9	7·6	8·3	9·0	9·9	10·6	11·3	12·	12·9	13·0	14·3	15·0
7 x 1½	4·5	5·3	6·2	7·	7·11	8·9	9·8	10·6	11·5	12·3	13·2	14·	14·11	15·9	16·8	17·6
8 x 1½	5·0	6·0	7·0	8·	9·0	10·0	11·0	12·0	13·0	14·0	15·0	16·	17·0	18·0	19·0	20·0
9 x 1½	5·8	6·9	7·11	9·	10·2	11·3	12·5	13·6	14·8	15·9	16·11	18·	19·2	20·3	21·4	22·6
10 x 1½	6·3	7·6	8·9	10·	11·3	12·6	13·9	15·0	16·3	17·6	18·9	20·	21·3	22·6	23·9	25·0
11 x 1½		8·3		11·		13·9		16·6		19·3		22·		24·9		27·6
12 x 1½	7·6	9·0	10·6	12·	13·6	15·0	16·6	18·0	19·6	21·0	22·6	24·	25·6	27·0	28·6	30·0
13 x 1½		9·9		13·		16·3		19·6		22·9		26·		29·3		32·6
14 x 1½	8·9	10·6	12·3	14·	15·9	17·6	19·3	21·0	22·9	24·6	26·3	28·	29·9	31·6	33·3	35·0

N.B.—In the odd sizes and lengths the result is given in **full** inches only.

Scantling to Superficial.

Length in Feet.

Size of scant'g.	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32
2 x 2	2·	2·4	2·8	3·0	3·4	3·8	4·	4·4	4·8	5·0	5·4	6·	6·8	7·4	8·	8·8	9·4	10·	10·8
3 x 2	3·	3·6	4·0	4·6	5·0	5·6	6·	6·6	7·0	7·6	8·0	9·	10·0	11·0	12·	13·0	14·0	15·	16·0
4 x 2	4·	4·8	5·4	6·0	6·8	7·4	8·	8·8	9·4	10·0	10·8	12·	13·4	14·8	16·	17·4	18·8	20·	21·4
5 x 2	5·	5·10	6·8	7·6	8·4	9·2	10·	10·10	11·8	12·6	13·4	15·	16·8	18·4	20·	21·8	23·4	25·	26·8
6 x 2	6·	7·0	8·0	9·0	10·0	11·0	12·	13·0	14·0	15·0	16·0	18·	20·0	22·0	24·	26·0	28·0	30·	32·0
7 x 2	7·	8·2	9·4	10·6	11·8	12·10	14·	15·2	16·4	17·6	18·2	21·	23·4	25·8	28·	30·4	32·8	35·	36·4
8 x 2	8·	9·4	10·8	12·0	13·4	14·8	16·	17·4	18·8	20·0	21·4	24·	26·8	29·4	32·	34·8	37·4	40·	42·8
9 x 2	9·	10·6	12·0	13·6	15·0	16·6	18·	19·6	21·0	22·6	24·0	27·	30·0	33·0	36·	39·0	42·0	45·	48·0
10 x 2	10·	11·8	13·4	15·0	16·8	18·4	20·	21·8	23·4	25·0	26·8	30·	33·4	36·8	40·	43·4	46·8	50·	53·4
11 x 2	11·	12·10	14.8	16·6	17·4	19·2	22·	23·10	25·8	27·6	29·4	33·	34·8	38·4	44·	47·8	51·4	55·	58·8
12 x 2	12·	14·0	16·0	18·0	20·0	22·0	24·	26·0	28·0	30·0	32·0	36·	40·0	44·0	48·	52·0	56·0	60·	64·0

Length of Scantling in Feet.

	6	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32	34
2 x 2½	2·6	3·4	3·9	4·2	4·7	5·0	5·5	5·10	6·3	6·8	7·6	8·4	9·2	10·0	10·10	11·8	12·6	13·4	14·2
3 x 2½	3·9	5·0	5·8	6·3	6·10	7·6	8·2	8·9	9·5	10·0	11·4	12·6	13·9	15·0	16·4	17·6	18·9	20·0	21·3
4 x 2½	5·0	6·8	7·6	8·4	9·2	10·0	10·10	11·8	12·6	13·4	15·0	16·8	18·4	20·0	21·8	23·4	25·0	26·8	28·4
5 x 2½	6·3	8·4	9·5	10·5	11·6	12·6	13·7	14·7	15·8	16·8	18·9	20·10	22·11	25·0	27·0	29·4	31·3	33·4	35·5
6 x 2½	7·6	10·0	11·4	12·6	13·9	15·0	16·3	17·6	18·9	20·0	22·6	25·0	27·6	30·0	32·6	35·0	37·6	40·0	42·6
7 x 2½	8·9	11·8	13·3	14·7	15·11	17·6	19·0	20·5	21·11	23·4	26·3	29·2	32·2	35·0	38·0	41·0	43·9	46·8	49·7
8 x 2½	10·0	13·4	15·0	16·8	18·4	20·0	21·8	23·4	25·0	26·8	30·0	33·4	36·8	40·0	43·4	46·8	50·0	53·4	56·8
9 x 2½	11·3	15·0	16·9	18·9	20·8	22·6	24·5	26·3	28·2	30·0	33·9	37·6	41·6	45·0	48·9	52·6	56·3	60·0	63·9
10 x 2½	12·6	16·8	18·9	20·10	23·0	25·0	27·1	29·2	31·3	33·4	37·6	41·8	45·10	50·0	54·2	58·4	62·6	66·8	70·1
12 x 2½	15·0	20·0	22·6	25·0	27·6	30·0	32·6	35·0	37·6	40·0	45·0	50·0	55·0	60·0	65·0	70·0	75·0	80·0	85·0

Floor, Roof and Stud Scantling, reduced to Superficial Measure.

Length in Feet.

Size, in.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3 x 3	4·6	5·3	6·	6·9	7·6	8·3	9·	9·9	10·6	11·3	12·	12·9	13·6	14·3	15·	15·9	16·6	17·3	18·
4 x 3	6·0	7·0	8·	9·0	10·0	11·0	12·	13·0	14·0	15·0	16·	17·0	18·0	19·0	20·	21·0	22·0	23·0	24·
5 x 3	7·6	8·9	10·	11·3	12·6	13·9	15·	16·3	17·6	18·9	20·	21·3	22·6	23·9	25·	26·3	27·6	28·9	30·
6 x 3	9·0	10·6	12·	13·6	15·0	16·6	18·	19·6	21·0	22·6	24·	25·6	27·0	28·6	30·	31·6	33·0	34·6	36·
7 x 3	10·6	12·3	14·	15·9	17·6	19·3	21·	22·9	24·6	26·3	28·	29·9	31·6	33·3	35·	36·9	38·6	40·3	42·
8 x 3	12·0	14·0	16·	18·0	20·0	22·0	24·	26·0	28·0	30·0	32·	34·0	36·0	38·0	40·	42·0	44·0	46·0	48·
9 x 3	13·6	15·9	18·	20·3	22·6	24·9	27·	29·3	31·6	33·9	36·	38·3	40·6	42·9	45·	47·3	49·6	51·9	54·
10 x 3	15·0	17·6	20·	22·6	25·0	27·6	30·	32·6	35·0	37·6	40·	42·6	45·0	47·6	50·	52·6	55·0	57·6	60·
11 x 3	16·6	19·3	22·	24·9	27·6	30·3	33·	35·9	38·6	41·3	44·	46·9	49·6	52·3	55·	57·9	60·6	63·3	66·
12 x 3	18·0	21·0	24·	27·0	30·0	33·0	36·	39·0	42·0	35·0	48·	51·0	54·0	57·0	60·	63·0	66·0	69·0	72·

Length in Feet.

	26	28	30	32	36	40	42	45	48	50	55	60	65	70	75	80	100
3 x 3	19·6	21·	22·6	24·	25·6	30·	31·6	33·9	36·	37·6	41·3	45·	48·9	52·6	56.3	60·	75·
4 x 3	26·0	28·	30·0	32·	34·0	40·	42·0	45·0	58·	50·	55·0	60·	65·0	70·0	75·0	80·	100·
5 x 3	32·6	35·	37·6	40·	42·6	50·	52·6	56·3	60·	62·6	68·9	75·	81·3	87·6	93·9	100·	125·
6 x 3	39·0	42·	35·0	48·	51·0	60·	63·0	67·6	72·	75·0	82·6	90·	97·6	105·0	112·6	120·	150·
7 x 3	45·6	49·	52·6	56·	58·6	70·	73·6	78·9	84·	87·6	96·3	105·	113·9	122·6	131·3	140·	175·
8 x 3	52·0	56·	60·0	64·	68·0	80·	84·0	90·0	96·	100·0	110·0	120·	130·0	140.0	150·0	160·	200·
9 x 3	58·6	63·	67·6	72·	76·6	90·	94·6	101·3	108·	112·6	123·9	135·	146·3	157·6	168·9	180·	225·
10 x 3	65·0	70·	75·0	80·	85·0	100·	105·0	112·6	120·	125·0	137·6	150·	162·6	175·0	187·5	200·	250·
11 x 3	71·6	77·	82·6	88·	93·6	110·	115·6	123·9	132·	137·6	151·3	165·	178·9	192.6	206·3	220·	275·
12 x 3	78·0	84·	90·0	96·	102·0	120·	126·0	135·0	144·	150·0	165·0	180·	195·0	210·0	225·0	240·	300·

SPACING TABLE.

Showing the **nearest number** of Hooks, Spikes, Laths, Dental Blocks, Pickets, Battens, Palings, &c., required when spaced in a **given length** (starting and finishing with **one**).

(Note.—If not starting with **one,** deduct it on Table).

Given length in feet	Spacing in Inches. 3	4	5	6	7	8	9	10	11	12	13	14	15
5	21	16	13	11	9	9	8	7	6	6	6	5	5
6	25	19	15	13	11	10	9	8	7	7	7	6	6
7	29	22	17	15	13	12	10	9	8	8	8	7	7
8	33	25	20	17	15	13	11	10	9	9	9	8	7
9	37	28	23	19	17	15	13	12	11	10	9	8	8
10	41	31	25	21	18	16	14	13	12	11	10	9	9
11	45	34	29	23	20	18	15	14	13	12	11	10	10
12	49	37	30	25	22	19	17	16	14	13	12	11	11
13	53	40	32	27	23	21	18	17	16	14	13	12	12
14	57	43	34	29	25	22	20	18	17	15	14	13	13
15	61	46	37	31	27	24	21	19	18	16	15	14	14
18	73	55	44	37	32	28	25	23	20	18	17	16	15
20	85	61	49	41	35	31	28	25	23	21	19	18	17
25	101	76	61	51	44	39	34	31	29	26	24	22	21
30	121	91	73	61	52	46	41	37	34	31	29	27	25
35	141	106	85	71	61	54	48	43	39	36	33	31	29
40	161	121	97	81	69	61	55	49	45	41	37	35	33
45	181	136	109	91	78	69	61	55	50	46	41	39	37
50	201	151	121	101	87	76	68	61	56	51	47	44	41
60	241	181	145	121	103	91	81	73	66	62	56	52	49
70	281	211	169	141	121	106	93	85	77	71	65	61	57
80	321	241	193	161	138	121	107	97	88	81	74	69	65
90	361	271	217	181	155	136	121	109	99	91	84	78	72
100	401	301	241	201	172	151	134	121	111	101	93	86	81

N.B.—If not starting with one deduct it on table.

The above is a simple division table to save contractor's time.

Example of how to use Spacing Table :—To find number of hooks or pickets, 5 inches apart, in 50 feet (starting and finishing with one) = 121—number required. Number of studs or joists, 17 inches apart in 25 feet (starting and finishing with one) = 19—number required.

MATERIALS REQUIRED PER SQUARE—18″ CENTRES.

	Super ft. per square
Floor joists and bearers.	
4 x 3 bearers 4 x 2 joists 3 x 1 plates	70
4 x 3 „ 4 x 2 „ 3 x 2 „	74
5 x 3 „ 5 x 2 „ 3 x 2 „	90
5 x 3 „ 6 x 2 „ 3 x 2 „	103
First Floor 8 x 2 „ 2 x 2 struts	117
„ „ 9 x 2 „ 2 x 2 „	130
Flooring.	
3 x 1 Tongued and Grooved	126
4 x 1 „ „ „	119
4½ x 1 „ „ „	115
6 x 1 „ „ „	112
Wall Framing.	
4 x 2 Studs, plates, etc. 3 x 1 Braces	84
3 x 2 „ „ „ 3 x 1 „	64
Ceiling Joists etc.	
4 x 2 joists 5 x 2 stiffener	70
5 x 2 „ 6 x 1½ „	77
Roof Framing (per square of roof surface).	
4 x 2 joists, 4 x 3 purlin 6 x 1 Ridge 7 x 1 Hips	93
5 x 2 „ 4 x 3 „ 6 x 1 „ 7 x 1 „	105
Flat Roofs.	
6 x 2 joists 4 x 1 T and G Flooring	200

CARTAGE RATES OF TIMBER.

In estimating timber costs the additional cost of cartage on price lists is important. In all examples of costs shown the minimum charge of 2/6 Per 100 Ft. Super for Hardwood and 1/3 per 100 Super for Softwoods has been allowed. A list with cartage rates is shown below with the approximate mileage rate. The mileage rate shown may be used as an approximate cost of cartage in Australia or where any particular place is not listed.

Where examples of costs are given it is important to add the extra cartage costs according to mileage transported.

CARTAGE RATES PER 100 SUPER FEET.

Minimum Cartage Rate—Hardwood	3/–	Softwood	1/6
5 to 15 Miles Cartage— „	4/9	„	2/3
15 to 25 „ „ „	6/3	„	3/–
25 to 30 „ „ „	7/9	„	4/–
30 to 40 „ „ „	9/3	„	4/9
40 to 50 „ „ „	11/–	„	5/6

SEASONING CHARGES.
MOISTURE CONTENT NOT EXCEEDING 15 PER CENT.
MAXIMUM RATES—PER 100 SUPER FEET

KIND OF TIMBER	THICKNESS IN INCHES			
	1 inch	1¼ ins.	1½ ins.	2 ins.
Ironbark and Brushbox ...	11/3	12/3	13/9	15/9
Blue Gum, Tallowwood, Red Mahogany, Turpentine ...	10/–	11/–	12/3	14/–
Other New South Wales Hardwoods	9/–	10/–	11/–	12/9
Hoop Pine, Kauri	5/9	6/6	7/3	8/3
N.S.W. and Queensland Soft Woods	7/–	7/9	8/9	10/–
Pinus Insignus and/or Radiata	6/6	7/–	7/9	8/9
Tasmanian Oak, Alpine Ash ...	8/–	8/9	9/9	12/–
Rimu, Matai, Tawa, New Zealand Beech	7/6	8/–	9/–	10/6
Oregon, Hemlock, Spruce and Balsam	5/9	6/6	7/3	8/3

For Moisture Content 15 per cent. to 18 per cent. deduct 25 per cent. from above prices.

Dressing, Double Dressing, Dressing All Round.

Species	Size	Double Dressing	Dressing all Round
Hardwoods	Not exceeding 3½ square inches end section.	2/6 per 100 lineal feet	2/9 per 100 lineal feet
	Exceeding 3½ square inches end section.	8/3 per 100 super feet	9/3 per 100 super feet
Softwoods, Scrubwoods and Brushwoods	Not exceeding 3½ square inches end section.	2/3 per 100 lineal feet	2/6 per 100 lineal feet
	Exceeding 3½ square inches end section.	7/3 per 100 super feet	8/3 per 100 super feet

Immunising.

Immunising Lyctus Borer Susceptible Softwoods, Brushwoods and/or Scrubwoods in accordance with the approval of the New South Wales Forestry Commission.—All species, 13/6 per 100 super feet.

N.S.W. HARDWOOD—Unseasoned.

Add Freight Surcharge 8/– per 100 Super Feet to all prices below. Random lengths to 21 ft.	Merchantable Per 100ft. super	Select Per 100ft. super
1½ and 2 x 1 and 2 x 2	83/3	86/9
3, 4, 6 and 7 x 1 and 1¼	86/9	92/9
3 x 1½ and 3 x 2	83/3	86/9
4 x 2	84/3	88/0
5 to 8 x 2	84/3	88/0
3 to 7 x 3	84/3	88/0
8 to 12 x 3	85/6	90/3
4 to 10 x 4	85/6	90/3
5 to 10 x 5	85/6	90/3
6 to 8 x 6	85/6	90/3
9 to 12 x 6	86/9	92/9
Junk 36″ end section and up ...	82/0	—
Special ordered sizes up to 35″ end section	85/6	91/6
Special ordered sizes 36″ end section and up	88/0	93/9

Sizes exceeding 12″ in width add 1/9 for each additional inch per 100 Super.

Random lengths exceeding 21 feet add 1/3 per 100 ft. super on prices.

Nominated lengths to 21 ft. add 3/6 per 100 ft. super on prices.

Nominated lengths 22 ft. and up add 3/6 per 100 super plus 1/3 per foot over 21 ft.

The following timbers specially ordered are extra on N.S.W. H.W. select grade prices :—Tallowwood, Red Mahogany, Spotted Gum, 7/– per 100 Super ft. extra ; Blue Gum, 4/9 ; Ironbark, 9/3 per 100 super. Other species 1/9 per 100 super ft. extra.

	D.D.	D.A.R.
Mill Dressing—Per 100 Lineal feet ...		
Sizes to 3½ square inches end section ...	2/6	2/9
,, over 3½ ditto per 100 sup. feet.	8/3	9/3

OREGON, HEMLOCK, SPRUCE and BALSAM.

	Per 100ft. Superface. Merchantable	Select Merch.	No. 2 Clears	No. 1 Clears
⅜ in. thick up to 12 in. wide to 24 ft. long	72/–	75/6	93/6	96/–
½ in. thick up to 12 in. wide to 24 ft. long	89/3	93/6	116/–	119/3
⅝ in. thick up to 12 in. wide to 24 ft. long	106/6	111/9	138/9	142/6
¾ in. thick up to 12 in. wide to 24 ft. long	123/–	129/–	160/6	164/9
	Per 100 ft. Super.			
2 x 2 and up to 12 x 6, lengths to 24 ft.	137/–	144/–	180/–	185/–
2 x 2 and up to 12 x 6, lengths 24 ft. to 30 ft.	139/–	146/–	182/–	187/–
2 x 2 and up to 12 x 6, lengths 30 ft. to 40 ft.	141/–	148/–	194/–	199/–

Battens:	Per 100 ft. Super. Merchantable	Select Merch.	No. 2 Clears	No. 1 Clears
1 and 1½ x 1, lengths to 24 ft.	144/–	151/–	187/–	192/–
1½ x 1¼ and 1½, lengths to 24 ft.	144/–	151/–	187/–	192/–
2 and 3 x 1, 1¼ and 1½, lengths to 24 ft.	144/–	151/–	187/–	192/–
Boards 4 in. to 12 in. wide, 1in, 1¼ in. and 1½ in. thick to 24 ft. long	138/–	145/–	181/–	186/–
Over 12 in. to 16 in. wide, per inch extra				2/–
Over 16 in. to 20 in. wide, per inch extra				3/–
Seamed for caulking, per 100 ft. super				5/–
⅜ in. to 1½ in. thick, any width, lengths over 24 ft. to 30 ft. per 100 ft. super extra				4/–

No. 1 Clear Oregon, Edge-Grained, Extra 5/– per 100 ft. super.
⅞ in. Supered and charged as 1in., 1⅛ in. as 1½ in. and 1¾ in. as 2 in.

Mill Dressing.	D.A.R.	D.D.
Sizes to 3½ square inches end section, per 100 ft. lineal	2/–	1/9
Sizes exceeding 3½ square inches end section, per 100 ft. super	7/3	6/3

QUALITY DEFINITIONS.

Merchantable :—Suitable for structural purposes, but not for dressing.
Selected Merchantable :—Better grade of Merchantable quality, suitable for dressing.
No. 2 Clears :—Good generally, but not entirely free from minor faults.
No. 1 Clears :—Specially selected.

REDWOOD (Unseasoned)

	Per 100 ft. superface ⅜ in. thick	½ in. thick	¾ in. thick	Per 100 ft. super lin. thick	1¼in., 1½in., 1¾in. & 2in. thick
8, 10, 11 & 12in. wide ...	106/6	134/–	187/–	208/–	211/–
13in. & 14in. wide	107/–	135/–	188/–	209/–	212/–
15in. & 16in. wide	107/6	135/6	189/–	210/–	213/–
17in. & 18in. wide	108/–	136/–	189/6	211/–	214/–
19in. & 20in. wide	109/–	137/6	191/6	213/–	216/–
21in. & 22in. wide	110/–	138/6	193/–	215/–	218/–
23in. & 24in. wide	111/–	140/–	195/–	217/–	220/–

Thicknesses over 2in. 10/– per 100 ft. super extra on price for 2in. thick.

Mill Dressing :	D.A.R.	D.D.
For sizes to 3½ square inches end section, per 100ft. lineal	2/6	2/3
For sizes exceeding 3½ square inches end section, per 100ft. super	8/3	7/3

WEATHERBOARDS—Per 100 ft. super.

Canadian Red Cedar, 4″ C. and nosed		173/–
Hardwood, rough splayed	6″ & 7″	69/–
„ D. & C. splayed	6″ & 7″	73/–
„ Dressed Rusticated	4″ & 6″	107/–
Cypress Pine, Dressed Rusticated	6″	110/–
Mahogany, Dressed Rusticated	4″ & 6″	114/–
Oregon, Dressed Rusticated	4″ & 6″	173/–
Canadian Red Cedar, Dressed Rusticated	4″ & 6″	209/3
Baltic Pine 7″ C. & C. or C. & N.		77/–

Selected lengths 3/6 per 100 super extra.

ARRIS RAILS

3in. Hardwood, per 100ft. lineal ...	38/–
4in. „ „ „ „ ...	67/–

FLOORING.

N.S.W. Hardwoods. Add freight surcharge 8/– per 100 sup. ft.

	15% to 18% M.C.		15% to 10% M.C.	
3x1 finished size $2\frac{3}{8}$x$\frac{3}{4}$in. / 4x1 „ „ $3\frac{3}{8}$x$\frac{3}{4}$in.	Select Grade	Standard Merchantable Grade	Select Grade	Standard Merchantable Grade
	Per 100ft. super		Per 100 ft. super	
Mixed N.S.W. Hardw'd	105/9	99/9	108/–	102/–
Blackbutt	107/6	99/9	109/9	102/–
Blue Gum	112/9	99/9	115/–	102/–
Spotted Gum	113/6	99/9	116/–	102/–
Tallowwood	111/3	99/9	113/9	102/–
Red Mahogany	113/6	99/9	116/–	102/–
Ironbark	116/9	99/9	119/6	102/–

Seasoned flooring in $1\frac{1}{4}$in. thickness plus 1/– per 100 super ft. extra.

N.Z. Rimu

	1st Class
4 x 1, finished size $3\frac{7}{16}$ x $\frac{27}{32}$in.	124/9
6 x 1 „ „ $5\frac{3}{8}$ x $\frac{27}{32}$in.	124/9
4 x $1\frac{1}{4}$ „ „ $3\frac{3}{8}$ x $1\frac{3}{32}$in.	124/9

Oregon (Clear)

4 x 1, finished size $3\frac{7}{16}$ x $\frac{3}{4}$in.	175/–
6 x 1 „ „ $5\frac{7}{16}$ x $\frac{3}{4}$in.	175/–

Cypress Pine (Unseasoned)

4 x 1, finished size $3\frac{7}{16}$ x $\frac{27}{32}$in.	120/–
$4\frac{1}{2}$ x 1 „ „ $3\frac{15}{16}$ x $\frac{27}{32}$in.	120/–
6 x 1 „ „ $5\frac{7}{16}$ x $\frac{27}{32}$in.	120/–

Baltic Pine

$6\frac{1}{2}$ x 1, finished size 6 x $\frac{7}{8}$in.	126/6 per 100 super.
$4\frac{1}{2}$ x 1 „ „ 4 x $\frac{7}{8}$in.	126/6 „ „ „
$6\frac{1}{2}$ x $\frac{7}{8}$ „ „ 6 x $\frac{3}{4}$in.	105/– „ „ „
$4\frac{1}{2}$ x $\frac{7}{8}$ „ „ 4 x $\frac{3}{4}$in.	105/6 „ „ „

Selected lengths 3/6 per 100 super extra.

PALINGS.

	5ft.	6ft.	7ft.	
3″ wide ...	67/6	72/3	78/3	per 100 count
4″ and wider	79/6	84/–	90/–	,, ,, ,,

4in. Dressed amd Cham. Mahogany for Fencing ... 46/– per 100ft. lineal.

LINING

N.Z. Rimu	Per 100 sup. feet
4 x ½ covers 3 7/16 in. T.G., V.J.	68/6
6 x ½ ,, 5 7/16 in. T.G., V.J., C.V.	68/6
4 x ⅝ ,, 3 7/16 in. T.G., V.J.	83/9
6 x ⅝ ,, 5 7/16 in. T.G., V.J., C.V.	83/9
4 x ¾ ,, 3 7/16 in. T.G., V.J.	99/3
Oregon (Seasoned Clears)	
4 x ½ covers 3 7/16 in. T.G., V.J.	113/9
6 x ½ ,, 5 7/16 in. T.G., V.J., C.V.	113/9
4 x ⅝ ,, 3 7/16 in. T.G., V.J.	135/–
6 x ⅝ ,, 5 7/16 in. T.G., V.J., C.V.	135/–
4 x ¾ ,, 3 7/16 in. T.G., V.J.	155/–
6 x ¾ ,, 5 7/16 in. T.G., V.J.	155/–
Cypress Pine	
3 x ¾ covers 2 7/16 in. T.G., V.J.	115/–
4 x ¾ ,, 3 7/16 in. T.G., V.J.	115/–
Baltic Pine.	
4 x ½ covers 3 7/16 in.	76/6
6 x ½ ,, 5 7/16 in.	76/6

Double dressed 4/– extra—selected lengths, 3/– extra.

COVERING CAPACITY OF LININGS (Locally Milled)

Lineal feet	Nominal size	Finished width	Superface	Square feet
305	4½ x ½, ⅝ or ¾	3 15/16 charged as	115 covers	100
202	6½ x ½, ⅝ or ¾	5 15/16 ,,	109 ,,	100
350	4 x ½	3 7/16 ,,	116 ,,	100
221	6 x ½	5 7/16 ,,	111 ,,	100

CYPRESS PINE (Unseasoned)

Lengths not less than 4ft. 6in. and not exceeding 20ft. of sizes up to 6in. x 6in.	111/– per 100ft. super
Ordered lengths to 15ft.	1/3 per 100ft. super
,, ,, 15ft. to 20ft.	3/6 ,,
,, ,, 20ft. to 24ft.	4/6 ,,
For each foot over 24ft.	1/3 ,,

SHINGLES

Redwood, unobtainable. Forest Oak, per 1,000 ... 97/–

TASMANIAN OAK (Seasoned)
Undressed Quarter Sawn

Select Grade	Per 100ft. Superface ⅜in. thick	½in. thick	¾in. thick	Per 100ft. Super lin. thick	1¼in. & 1½in. thick	2in. thick
3in. wide	50/6	62/–	85/–	94/6	100/6	101/–
4in. „ ...	55/–	68/–	93/6	103/6	100/6	101/–
5in. „	54/–	66/9	92/–	101/6	109/–	110/–
6in. „	54/–	66/9	92/–	101/6	107/6	110/–
7in. and 8in. wide ...	55/–	68/–	93/6	103/6	107/6	110/–
9in. and 10in. wide	56/–	69/–	95/6	105/9	110/6	113/6
11in. and 12in. wide	60/–	74/–	102/3	113/6	117/–	121/–

Squares : 2 x 2 Seasoned ... ... 101/– per 100ft. super
2½ x 2½ Unseasoned ... ... 94/– „
3 x 3 „ ... ... 98/6 „

Ordered lengths—3/– per 100 super extra.

Mill Dressing :	D.A.R.	D.D.
Sizes to 3½ square inches end section, per 100ft. lineal	2/9	2/6
Sizes exceeding 3½ square inches end section, per 100ft. super	9/3	8/3

PACIFIC MAPLE (Unseasoned)

Select Grade (1st Class)	Per 100ft. superface ⅜in. thick	½in. thick	¾in. thick	Per 100ft. super lin. thick	1¼in., 1½in. & 2in. thick
Up to 11in. wide ...	75/6	95/6	132/6	145/–	148/–
12in. & 13in. wide	76/6	97/3	135/–	147/–	151/–
14in. & 15in. wide	77/–	98/–	136/–	148/–	152/–
16in. & 17in. wide	77/6	98/6	137/–	149/–	153/–
18in. wide ...	79/6	101/–	140/3	153/–	157/–

Thicknesses over 2in., 3/– per 100ft. super extra on 2in. prices.

Squares : 2 x 2, 2½ x 2½ and 3 x 3 ... ... 145/– per 100ft. super
4 x 4 and 5 x 5 ... ... 151/– „
6 x 6 ... ... 156/– „

Ordered lengths—3/– per 100 ft. super extra.

Mill Dressing :	D.A.R.	D.D.
For sizes not exceeding 3½ square inches end section, per 100ft. lineal	2/6	2/3
For sizes exceeding 3½ square inches end section, per 100ft. super	8/3	7/3

Seasoning (moisture content not exceeding 15%) extra :—lin., 7/– ; 1¼in., 7/9 ; 1½in., 8/9 ; 2in., 10/– per 100ft. super.

Merchantable (2nd Class)	Per 100ft. superface ¾in. thick	Per 100ft. super lin. & thicker
Under 12in. wide	77/–	84/6
12in. and wider	82/6	91/–

Ordered lengths—3/– per 100 ft. super extra.

Mill Dressing	D.A.R.	D.D.
For sizes not exceeding 3½ square inches end section, per 100ft. lineal	2/6	2/3
For sizes exceeding 3½ square inches end section, per 100ft. super	8/3	7/3

Seasoning (moisture content not exceeding 15%) extra :—lin., 7/– ; 1¼in., 7/9 ; 1½in., 8/9 ; 2in., 10/– per 100ft. super.

N.Z. RIMU 1st CLASS (Unseasoned)

	Per 100ft. superface			Per 100ft. super	
	⅜in. thick	½in. thick	¾in. thick	1in. thick	1¼in., 1½in. & 2in. thick
Up to 6in. wide (excluding 4 & 6in. wide x 1in. thick)	56/6	69/9	96/3	106/9	106/9
4in. & 6in. wide ...	58/6	72/6	100/–	111/–	—
7in. & 8in. wide ...	58/3	72/–	99/6	110/6	110/6
9in. to 12in. wide ...	60/3	74/9	103/3	114/9	114/9
13in. & 14in. wide ...	61/9	76/6	106/–	117/9	117/9
15in. & 16in. wide ...	63/3	78/6	108/9	120/9	120/9

Over 16in. wide 1/3 per 100ft. super for each additional inch over 16in. wide.

Ordered lengths—3/– per 100 super extra.

Mill Dressing :	D.A.R.	D.D.
Sizes to 3½ square inches end section, per 100ft. lineal	2/6	2/3
Sizes exceeding 3½ square inches end section, 100ft. super	8/3	7/3

QUEENSLAND RED CEDAR (Unseasoned)

	Per 100ft. superface			Per 100ft. super
Select Grade	⅜in. thick	½in. thick	¾in. thick	lin. & thicker
Up to 6in. wide ...	103/–	128/–	178/–	200/–
7in. wide	103/6	129/–	179/–	201/–
8in. „	104/–	129/6	180/–	202/–
9in. „	104/6	130/6	181/–	203/–
10in. „	105/–	131/–	182/–	204/–
11in. „	105/6	132/–	183/–	205/–
12in. „	106/–	132/6	184/–	206/–
13in. „	106/6	133/6	185/–	207/–
14in. „	107/–	134/–	186/–	208/–
15in. „	107/6	135/–	187/–	209/–
16in. „	108/–	135/6	188/–	210/–
17in. „	108/6	136/6	189/–	211/–
18in. „	109/–	137/–	190/–	212/–

Widths exceeding 18in., 1/– per 100 ft. super for each additional inch of width in excess of 18in.

Squares : 2 x 2	201/–	per 100ft. super
2½ x 2½	201/–	„
3 x 3	204/–	„
4 x 4	213/–	„
5 x 5 and 6 x 6	215/–	„

Ordered Lengths—3/6 per 100 super extra.

Mill Dressing :	D.A.R.	D.D.
For sizes not exceeding 3½ square inches end section, per 100ft. lineal	2/6	2/3
Sizes exceeding 3½ square inches end section, per 100ft. super	8/3	7/3
Cedar for Plugs	13/6	per bag

QUEENSLAND KAURI PINE.

Select Grade (unseasoned)—Sizes (other than squares).

To 6in. wide x 1 in. and thicker—123/6 per 100 sup. ft.
Each additional inch in width—1/– per 100 sup. ft. extra.

	⅜in. thick	½in. thick	¾in. thick	
Up to 6 inches wide ...	65/–	80/6	111/–	per 100 ft. superface
Each additional 1in. wide add	6d.	9d.	1/–	,, ,,

Squares—Per 100 Sup. Feet.

2″ x 2″, 2½″ x 2½″, 3″ x 3″—124/–. 4″ x 4″—126/6. 5″ x 5″—132/6. 6″ x 6″—134/–.
Extra :—Quarter Sawn, 3/–. Selected lengths, 3/6.
Mill Dressing to 3½ sq. in. section—D.A.R., 2/– ; D.D., 1/9, per 100 ft. lineal.
Mill Dressing exceeding 3½″—D.A.R., 7/3 ; D.D., 6/3, per 100 ft. super.

QUEENSLAND MAPLE (unseasoned) First Class.

Sizes (other than squares).

Up to 6in. wide x 1in. to 2in. thick—148/6 per 100 sup. ft.
Each additional inch in width—1/– per 100 sup. ft. extra.
Each additional inch in thickness—1/– per 100 up. ft. extra.

	⅜in. thick	½in. thick	¾in. thick	
Up to 6 inches wide ...	77/6	95/6	133/–	per 100 feet superface
Each additional 1in. wide add	6d.	9d.	1/–	,, ,,

Squares—Per 100 super feet.

2″ x 2″, 148/–. 2½″ x 2½″, 149/–. 3″ x 3″, 152/6. 4″ x 4″, 160/–. 5″ x 5″, 163/–. 6″ x 6″, 163/–.

Selected lengths—3/6 per 100 ft. super.
Mill dressing to 3½ sq. in. section D.A.R., 2/6 ; D.D., 2/3 per 100 ft. lineal.
Mill dressing exceeding 3½in. section—D.A.R., 8/3 ; D.D., 7/3 per 100 ft. super.

FLOORS AND JOISTS.

Flooring and joists are generally calculated together at per 100 square feet usually called per square. Examples of cost are given in this manner, with all items in detail to allow of easy adjustment for different classes and sizes of timbers to be used. Labour costs are based on wages shown in " Awards."

T. and G. FLOORING AND LINING.
NUMBER OF BOARDS OF DIFFERENT FACE WIDTHS TO COVER 100 SQUARE FEET
and Number of Nails necessary per Square for Joists 18 inches apart.

A 7-lb. packet 1¾in. x 11 Gauge = 1225 nails or 175 to the lb., and will nail about 4 squares, 2 nails to each joist crossing.

280 nails per square = 20 boards 10ft. 6in. wide = 200 ft. run.
308 nails per square = 22 boards 10ft. 5½in. wide = 220 ft. run.
420 nails per square = 30 boards 10ft. 4in. wide = 300 ft. run.
480 nails per square = 34½ boards 10ft. 3½in. wide = 345 ft. run.
560 nails per square = 40 boards 10ft. 3in. wide = 400 ft. run.
680 nails per square = 48 boards 10ft. 2½in. wide = 480 ft. run.

APPROX. NUMBER OF NAILS TO THE POUND.

Size.	Nails per lb.	Size.	Nails per lb.	Size.	Nails per lb.
in.		in.		in.	
1 x 16G	1080	2 x 11G	158	3 x 9G	67
1 x 15G	840	2 x 10G	120	3 x 8G	60
1 x 14G	723	2 x 9G	100	3 x 7G	48
1½ x 14G	460	2½ x 13G	200	3 x 6G	39
1½ x 13G	340	2½ x 12G	150	3½ x 8G	44
1½ x 12G	240	2½ x 11G	130	3½ x 7G	40
1½ x 11G	206	2½ x 10G	100	4 x 7G	35
2 x 14G	280	2½ x 9G	80	4 x 6G	30
2 x 13G	230	2½ x 8G	65	5 x 5G	21
2 x 12G	190	3 x 10G	81	6 x 4G	13

NAILS.

Number of Diamond Head Nails in a 7lbs. packet.
Different lengths and gauges.

In. Gauge.	Approx. Number.	In. Gauge.	Approx. Number.
1 x 16	7400	2½ x 11	910
1 x 15	5600	2½ x 10	700
1 x 14	5000	2½ x 9	560
1½ x 14	2300	2½ x 8	455
1½ x 12	1680	3 x 10	567
1½ x 11	1440	3 x 9	469
1¾ x 11	1225	3 x 8	420
2 x 14	1860	3 x 7	336
2 x 13	1710	3 x 6	273
2 x 12	1330	3½ x 8	308
2 x 11	1064	3½ x 7	280
2 x 10	840	4 x 7	245
2 x 9	700	4 x 6	210
2½ x 13	1400	5 x 5	147
2½ x 12	1050	6 x 4	91

SPACING TABLE.—Useful for finding the **nearest Number** of Pickets, Battens, Studs, Joists, Projections, Sleepers, Posts, &c., in a given length, over 15 inches apart :—

Lin. feet run	Spacing in Inches. 15	16	17	18	20	24	30	36	42	48	60	72
5	5	4	4	4	4	3	3	3	3	3	2	2
6	6	5	5	5	5	4	4	3	3	3	3	3
7	7	7	6	6	6	5	4	4	3	3	3	3
8	7	7	7	7	6	5	5	4	4	3	3	3
9	8	8	8	7	7	6	5	4	4	4	3	3
10	9	9	9	8	7	6	5	5	4	4	3	3
11	10	10	9	9	8	7	6	5	5	4	4	3
12	11	10	9	9	9	7	6	5	5	4	4	4
13	12	11	10	10	9	8	7	6	5	5	4	4
14	13	12	11	11	10	8	7	6	5	5	4	4
15	14	13	12	11	10	9	7	6	6	5	4	4
18	15	15	14	13	12	10	9	7	7	6	5	4
20	17	16	15	15	13	11	9	8	7	6	5	6
25	21	20	19	18	16	14	11	10	9	8	6	5
30	25	24	22	21	19	16	13	11	10	9	7	6
35	29	28	27	25	22	19	15	13	11	10	8	7
40	33	31	30	28	25	21	17	15	13	11	9	8
45	37	35	33	31	28	24	19	16	14	13	10	9
50	41	38	37	35	31	26	21	18	16	14	11	10

If not starting with one, deduct it upon Table.

For Spacing Table up to 1 mile, for fencing posts, or droppers, &c., *see* WIRE WORKER.

COVERING CAPACITY OF FLOORING (Locally Milled)

Lineal feet	Nominal size	Finished size		Super feet		Square feet
505	3 x 1	$2\frac{3}{8}$ x $\frac{27}{32}$	Charged as	126	Covers	100
505	3 x $1\frac{1}{4}$	$2\frac{3}{8}$ x $1\frac{3}{32}$	,,	158	,,	100
349	4 x 1	$3\frac{7}{16}$ x $\frac{27}{32}$	,,	116	,,	100
356	4 x 1	$3\frac{3}{8}$ x $\frac{27}{32}$	,,	119	,,	100
356	4 x $1\frac{1}{4}$	$3\frac{3}{8}$ x $1\frac{3}{32}$	,,	148	,,	100
305	$4\frac{1}{2}$ x 1	$3\frac{15}{16}$ x $\frac{27}{32}$	,,	115	,,	100
305	$4\frac{1}{2}$ x $1\frac{1}{4}$	$3\frac{15}{16}$ x $1\frac{3}{32}$	,,	143	,,	100
223	6 x 1	$5\frac{3}{8}$ x $\frac{27}{32}$	,,	112	,,	100
202	$6\frac{1}{2}$ x 1	$5\frac{15}{16}$ x $\frac{27}{32}$	,,	109	,,	100

CARTAGE RATES.

In the following examples the minimum cartage rate of 2/6 per 100 super feet for hardwood and 1/3 per 100 super feet for softwoods has been allowed. This applies to an approx. distance of 5 miles, and an additional charge of 1/3 for Hardwoods and 9d. for Softwoods for each ten miles extra cartage must be added to costs.

Besides the loss in covering capacity of flooring due to milling, a 10 per cent. waste has been allowed for " cutting down " floors.

Contractors must add their own profits on costs, etc.

GROUND FLOOR JOISTS—HARDWOOD.

The following examples are calculated on merchantable Hardwood prices plus 3/6 per 100 super extra for nominated lengths with minimum cartage rate to 5 miles 2/6 per 100 super for hardwood and 1/3 per 100 super for softwood included. Adjust cartage beyond this distance.

The timber content is shown to assist cartage adjustment. Add approximately 1/6 hardwood and 1/– softwood per 100 super for each additional 10 miles.

4″ x 2″ H.W. Joists—Example No. 1—Laid per square.	£	s.	d.
3 x 2 H.W. Plates—2/10—10 super ft. at 89/3 ...		8	11
4 x 3 H.W. Bearer—1/10—10 super ft. at 90/3 ...		9	1
4 x 2 H.W. Joists—8/10—54 super ft. at 90/3	2	8	9
Add freight surcharge—75 super ft. at 8/–		6	0
Labour Laying Joists and Nails		16	0
Timber 74 super feet—Cost per square	£4	8	9

5″ x 2″ H.W. Joists—Example No. 2—Per square	£	s.	d.
3 x 2 H.W. Plates —2/10—10 super ft. at 89/3... ...		8	11
5 x 3 H.W. Bearer—1/10—13 super ft. at 90/3... ...		11	9
5 x 2 H.W. Joists—8/10—67 super ft. at 90/3... ...	3	0	6
Add freight surcharge—90 super ft. at 8/–		7	6
Labour laying, nails, etc.		17	0
Timber 90 super ft.—Cost per square	£5	5	8

6″ x 2″ H.W. Joists—Example No. 3—Per Square	£	s.	d.
3 x 2 H.W. Plates—2/10—10 super ft. at 89/3		8	11
5 x 3 Bearers—1/10—13 super ft. at 90/3		11	9
6 x 2 Joists—8/10—80 super ft. at 90/3	3	12	3
Add freight surcharge—103 super ft. at 8/–		8	3
Labour and nails		19	0
Timber 103 super feet—Cost per square	£6	0	2

4″ x 2″ Cypress Joists—Example No. 4—Cypress Pine—Per square.	£	s.	d.
3 x 2 Cypress Plates—2/10—10 super ft. at 111/– ...		11	0
4 x 3 Cypress Bearer 1/10—10 super ft. at 111/– ...		11	0
4 x 2 Cypress Joists—8/10—54 super ft. at 111/– ...	3	0	0
Labour and nails		16	0
Timber 74 super feet—Cost per square	£4	18	0

FIRST FLOOR JOISTS—OREGON.

Add cartage approx. 1/– per 100 super for each 10 miles additional.

Example No. 5—9″ x 2″ Oregon Joists—Per square	£	s.	d.
9 x 2 Oregon Joists—8/10—120 super ft. at 138/3 ...	8	5	11
Labour and nails	1	10	0
2 x 2 Herring-Bone strutting—27ft.—9 super ft. at 138/3		13	0
Labour and nails	1	18	0
Timber 130 super ft.—Cost per square ...	£12	6	11

Example No. 6—8″ x 2″ Hardwood Joists—Per square.	£	s.	d.
8 x 2 Hardwood Joists—8/10—108 super ft. at 90/3 ...	4	17	6
Labour and nails	1	10	0
2 x 2 Herringbone Strutting—9 super ft. at 89/3 ...		8	0
Add freight surcharge—117 super ft. at 8/– ...		9	6
Labour and nails	2	4	0
Timber 117 super ft.—Cost per square ...	£9	9	0

Add 1/6 per 100 super for each 10 miles additional cartage.

FLOORING—NETT COSTS.

The following examples of flooring per square, laid, punched and cleaned off, are to be added to the appropriate examples of joists on which they are laid.

A minimum cartage rate of 5 miles has been added, plus loss of covering capacity in milling with a 10 per cent. wastage in cutting down.

The cost is based on timber prices shown elsewhere.

Add Floorlayers, profit if sub-letting contract.

Adjust cartage 2/– for H.W. and 1/3 softwood per square for each additional 10 miles.

Labour laying at £1 10s. 0d. per square.

Secret nailing add 5/– per square.

4″ x 1″ T. & G. Hardwood Flooring—Laid Complete—Per square.

	Seasoned 15% to 18% moisture.						Seasoned 10% to 15% moisture.					
	Merchantable			Select			Merchantable			Select		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
NSW. mixed hardwood	9	5	0	9	13	0	9	8	6	9	15	0
Black Butt	9	5	0	9	15	0	9	8	6	9	18	6
Blue Gum	9	5	0	10	3	0	9	8	6	10	6	0
Spotted Gum ...	9	5	0	10	4	0	9	8	6	10	8	0
Tallow Wood ...	9	5	0	10	4	0	9	8	6	10	8	0
Red Mahogany ...	9	5	0	10	4	0	9	8	6	10	8	0

Soft Wood Flooring—Laid Complete—Per square.

Labour laying at £1 4s. 0d. per square.

	1st Class £ s. d.
N.Z. Rimu—4″ x 1″ and 6″ x 1″	10 14 0
N.Z. Rimu—4″ x 1¼″	12 12 0
Oregon Pine—T. & G.	13 8 0
Cypress Pine—T. & G.	9 15 0
Baltic Pine—4½″ x 1″	10 3 0
Baltic Pine—4½ x ⅞″	8 14 0

Example of Combined Flooring and Joists—Per square.

A First Class Rimu Floor laid on 9″ x 2″ Oregon 1st floor joists—

	£ s. d.
Cartage say 10 miles.	
Flooring—1st Class Rimu	10 14 0
Cartage 5 additional miles	1 3
Joists—9″ x 2″ Oregon—Example No. 5	12 6 11
Cartage 10 miles additional—130 sup. ft. at 1/– ...	1 3
Nett Cost Flooring and Joists combined—per square ...	£23 3 5

Flooring Secret Nailed, add 5/– per square.
Add profit and sub-contractors' profit if sub-let.

FLOOR SURFACING OR SANDING.

Electric floor surfacers with trained operator can be hired by the day for the approximate sum of £6 per day of eight hours. Garnet paper for the machine is supplied. These machines usually surface from 6 to 8 squares a day—depending on the condition of the flooring and on the quality of finish required.

Floor Sanding to New Work—Approximate Prices.

	Per Sq. Yd.	Per Square
Domestic—Large areas	2/6	25/–
Small areas	4/9	50/–
Industrial—Large areas	2/6	25/–

Floor Sanding, Wax and Polish.

Domestic—Large areas	3/4	37/6
Small areas	6/–	66/8
Industrial—Large areas	2/6	27/9

PARQUET FLOORING.

This type of flooring is sometimes known as wood block or superimposed flooring and consists of fixing narrow selected species of seasoned timber, tongued and grooved on the sides and end matched, to a wooden or concrete floor. The parquet floor is laid down on an approved mastic to ensure adhesion and give an even finished surface. By using narrow timber of various sizes, designs or patterns are made in the flooring and accentuated by the use of various types of light and dark timbers.

Prices from 39/– to 42/– per square yard.—Satin Wood.

FINISHING THE WOODEN FLOOR.

Floor Finishes.

The generally accepted best practice in finishing a wooden floor which is to be displayed is to polish it with a floor wax.

There are other methods, such as staining, varnishing and lacquering, but these finishes are not permanent, are very easily scratched and worn, and require continual expert attention. There should be no necessity to colour a new floor by staining, as the range of colours available in New South Wales flooring is such as to give any colour desired.

Method.

The flooring should be cleaned off to a smooth level surface. This is best done by a machine sander, but may be done also very laboriously by hand with a box scraper and hand sanding.

For a good finish with a sanding machine it is usual to traverse the floor each way diagonally to the direction of the boards and then up and down the length of the boards with finer papers until a glassy polished surface is obtained.

The next step is to fill the grain and any very small cracks between the boards (small holes should be filled with putty)—this filling may be purchased ready mixed from any reputable paint dealer but may be mixed by the user.

The formula set out hereunder represents an average type and should be found satisfactory :—

5lb. whiting, ½ gal. raw linseed oil, 1 quart mineral turpentine, 1 quart terebene.

To this it is necessary to add an oil stain or dry colour to bring the colour of the filler up to that of the floor, e.g., Yellow Ochre for Tallowwood, Venetian Red for Red Mahogany.

This filler must be laid on in a thick coat and may be brushed or better rubbed in with a piece of burlap or hessian across the grain. Fill about 5 or 6 square yards at one operation before proceeding with the next portion.

This should be allowed to stand for about twenty minutes and then rubbed in and cleaned off with a piece of burlap or hessian. Great care should be taken that the filler is removed from the surface ; if left it will set hard and is very difficult to remove, and even when removed will often leave a patchy floor. The floor should be scrupulously cleaned up with a brush. Preferably it should then be left to dry for about twenty-four hours. If a quick job is desired a thin coat of shellac may be applied over the filler and polishing started immediately the shellac is dry. It is necessary to very lightly paper the shellac as it has a tendency to raise the grain.

In the case of softwoods it is always necessary to bind the filler and this is done by giving the floor two thin coats of shellac. A newly filled floor should not be walked on and to avoid this the filling should be commenced at the end of the room remote from the doorway. The floor should then be finished with two thin coats of wax applied with a machine polisher. There are a number of good prepared floor waxes on the market and these are probably the most satisfactory. A wax may be prepared by the user by shredding beeswax or a good quality paraffin wax (or a mixture of the two) into turpentine until a

paste about the constituency of butter is obtained. The wax is first heated over a fire and the turpentine warmed and then mixed in. Great care is essential in this operation as the mixture is highly inflammable.

The above process with obvious modifications could be adapted for hard finishing the floor but the machine job is by far superior.

Those finishing the floor and maintaining it should bear in mind that " little wax and much rubbing " is the only way to secure a really satisfactory floor.

Maintenance.

For maintenance purposes floors should not be waxed too often and generally should be only dry polished as dirt will become embedded in the wax if too much is used. Generally for residences, waxing about once a month is sufficient, except where heavy traffic occurs, such as in halls or doorways, such parts can be re-waxed more often.

Caution.

In cases where waxed floors become dirty, WATER OR OIL should never be used, any necessary cleaning being effected by mineral turps. Water raises the " grain " of timber and leaves a rough dirty appearance while oil causes dust and dirt to adhere to the surface, which will in time become black.

In those cases where the floor has become dirty it is advisable to clean the accumulated dirty wax off. This is best done by swabbing a liberal quantity of mineral turps over the surface and scrubbing with steel wool. The dirty wax is then mopped up with clean rags or cotton waste.

External Floors.

For floors exposed to the weather an oiled finish is recommended. It is necessary to well sand the floor before applying the oil, which is mixed in proportions of 1 gal. raw linseed oil, 1 gal. of turps and 1 pint of terebene. This should be applied with a brush or mop and allowed to stand for about an hour and then carefully rubbed off and well polished. Apply two coats as above, if a shiny finish is desired gloss oil can be substituted for the linseed oil in the second coat. **Too much stress cannot be laid on the necessity for wiping off the surplus oil prior to polishing as it will collect dust and dirt and soon become dingy.**

To maintain this floor, give a thin coat of oil each year, or more often if required.

In cases where the ends of the boards are fully exposed to the weather, it is advisable to paint the ends with three coats of oil paint to a minimum distance of 6 inches from the edge.

WALL STUDDING.

In calculating the cost of walls with various coverings the cost of the wall plates, studs, braces, nogging, e.g., the naked frame structure, is shown first in Examples of cost. Then the costs of various weatherboard coverings are shown. Other wall coverings are shown in their own chapters.

All examples calculated at 18in. centres spacing of studs, and includes minimum cartage of 2/6 per 100 super feet for hardwood and 1/3 per 100 super feet for softwood.

Example of Cost No. 1—Hardwood 4″ x 2″—18″ centres—Per square = 100 square feet.	£	s.	d.
4″ x 2″ H.W. studs and noggings — 10/10—66 super ft. at 86/9 per 100 super ft.	2	18	0
4″ x 2″ H.W. top and bottom plate — 2/10—14 super ft. at 86/9 per 100 super ft.		12	6
3″ x 1″ H.W. Brace—1/14—4 super ft. at 89/3 per 100 super ft.		3	9
Add freight surcharge—84 super ft. at 8/–		7	0
Labour on studding and nails	1	17	0
Timber 84 super feet—Nett cost per square	£5	18	3

Add profit and adjust cartage rates of timber.

Example of Cost No. 2—Oregon 4″ x 2″—18″ Cent–Per Square	£	s.	d.
4″ x 2″ Oregon Studs and nogging—10/10—66 super ft. at 138/3 per 100 super ft.	4	11	3
4″ x 2″ Oregon top and bottom plate—2/10—14 super ft. at 138/3 per 100 super ft.		19	5
3″ x 1″ Oregon brace—1/14—4 super ft. at 145/3 per 100 super ft.		5	10
Labour on studding and nails	1	11	0
Timber 84 super feet—Nett cost per square	£7	7	6

Example of Cost No. 3—3″ x 2″ H.W. Studding—Per square	£	s.	d.
3″ x 2″ H.W. Studs and nogging—10/10—50 super ft. at 85/9 per 100 super ft.	2	3	0
3″ x 2″ H.W. top and bottom plates—2/10—10 super ft. at 85/9 per 100 super ft.		8	9
3″ x 1″ H.W. Brace—1/14—4 super ft. at 89/3 per 100 super ft.		3	7
Add freight surcharge—64 super ft. at 8/–		5	3
Labour on studding and nails	1	11	0
Timber 64 super feet—Nett cost per square	4	11	7

Example of Cost No. 4—3″ x 2″ Oregon Studding—per square	£	s.	d.
3″ x 2″ Oregon Studs and nogging 10/10—50 super ft. at 138/3 per 100 sup. ft.	3	9	2
3″ x 2″ Oregon top and bottom plates—2/10—10 super ft. at 138/3 per 100 super ft.		13	10
3″ x 1″ Oregon brace—1/14—4 super ft. at 145/3 per 100 super ft.		5	10
Labour on studding and nails	1	11	0
Timber 64 super feet—Nett cost per square	£5	19	10

Example of Cost No. 5—Structure Factory—Hardwood—per square.	£	s.	d.
6″ x 2″ H.W. studs—8/10—80 super ft. at 86/9 per 100 super ft.	3	9	6
6″ x 2″ H.W. top and bottom plate—2/10—20 super ft. at 86/9 per 100 super ft.		17	4
4″ x 1½″ H.W. Brace—1/14—7 super ft. at 88/– per 100 super ft.		6	2
Add freight surcharge—107 super ft. at 8/–		8	9
Labour on studding and nails	2	5	0
Timber 107 super feet—Nett cost per square	£7	6	9

WALL COVERINGS.

The costs of wall coverings are given separately.

These costs are to be combined to the costs of the naked structure on which they are fixed.

These costs are given in examples No. 1 to No. 5 on preceding pages.

Minimum cartage charges are included in costs together with 40 per cent. loss in lapping and wastage in cutting.

Add extra 1/9 H.W. and 1/– softwood per square for each 10 additional miles.

Weather Boards—Fixed—Per square.
Labour and Nails at £2 8s. 0d. per square.

Timber Prices as shown in preceding pages

	Cost per sq.—Fixed £	s.	d.
Canadian Red Cedar, 4″ Chamfered and Nosed	10	2	0
Hardwood, Rough Splayed—6″ and 7″	7	5	0
Hardwood, Dressed and Chamfered, Splayed—6″ and 7″ ...	7	13	0
Hardwood, Dressed, Rusticated—4″ and 6″	10	2	0
Cypress Pine, Dressed, Rusticated—6″	10	4	0
Mahogany, Dressed Rusticated—4″ and 6″	10	6	0
Oregon, Dressed Rusticated—4″ and 6″	14	13	0
Canadian Red Cedar, Dressed Rusticated—4″ and 6″ ...	17	2	6
Baltic Pine, 7″, Dressed	7	18	0

Example of Combined Weather Boards and Studding.

Mahogany Dressed and Rusticated weatherboards fixed on 4″ x 2″ Oregon studs. Timber cartage say 10 miles.

	Per square £ s. d.
Mahogany weatherboards	10 6 0
Cartage 5 additional miles for 1/9	1 9
4 x 2 Oregon studs—from Example No. 2	7 7 6
Cartage—84 super ft. Timber for 9d.	9
Cost Mahogany W.B.—Oregon Studs—10 miles Cartage—Per square	£17 16 0

CEILING JOISTS.
EXAMPLES OF COST PER SQUARE.

Example No. 1—4″ x 2″ H.W.	£ s. d.
4″ x 2″ H.W. Joists 8/10—60 super ft. at 86/9 per 100 super feet	2 12 3
5″ x 2″ H.W. Stiffener—1/10—10 super ft. at 86/9 per 100 super ft.	8 9
Add freight surcharge—70 super ft. at 8/- per 100 super ft.	5 9
Labour fixing 12/- and nails 1/-	13 0
Nett cost 4″ x 2″ joists per square	£3 19 9
If soldier pieces fixed to joist and stiffener add	2 6
Timber 70 super feet—Nett Cost ... ... Add Profit and adjust cartage rates.	£4 2 3

Example No. 2—5″ x 2″ H.W.	£ s. d.
5″ x 2″ H.W. Joists—8/10—67 super ft. at 86/9 per 100 Super ft.	2 18 0
6″ x 1½″ H.W. Stiffener—1/10—10 super ft. at 88/- per 100 super ft.	8 10
Add freight surcharge—77 super ft. at 8/-	6 2
Labour fixing 13/6, Nails 1/-	14 6
1 Row soldier pieces fixed to stiffeners—10 at 3d. ...	2 6
Timber, 77 super feet—Nott cost per square	£4 10 0

Example No. 3—4″ x 2″ Oregon.	£ s. d.
4″ x 2″ Oregon joists—8/10—60 super ft. at 138/3 per 100 super ft.	4 3 0
6″ x 2″ Stiffener—1/10—10 super ft. at 138/3 per 100 super ft.	13 10
Labour fixing 12/-, Nails 1/-.	13 0
Timber, 70 super feet—Nett cost 4″ x 2″ Oregon joists per square	£5 9 10

ROOFS

ROOF—CONSTANTS FOR ASCERTAINING THE LENGTH OF RAFTERS AND HIPS.

The Half-Span being Unity, or 1.

	Slope	Angle of Rafter	Angle of Hip	Length of Rafter	Length of Hip	Height of Roof
		deg. min.	deg. min.			
Rise $\frac{1}{3}$ span ...	4 to 1	14·	10·2	1·031	1·437	·250
,, $\frac{1}{6}$,, ...	3 to 1	18·26	13·15	1·054	1·452	·333
,, $\frac{1}{5}$,, ...	$2\frac{1}{2}$ to 1	21·49	15·47	1·077	1·469	·400
,, $\frac{1}{4}$,, ...	2 to 1	26·34	19·27	1·118	1·500	·500
,, $\frac{1}{3}$,, ...	$1\frac{1}{2}$ to 1	33·42	25·14	1·202	1·563	·667
square roof ...	1 to 1	45·	35·16	1·414	1.732	1·000
Rise $\frac{2}{3}$ span ...	$\frac{3}{4}$ to 1	53·8	43·19	1·667	1·943	1·333
,, $\frac{3}{4}$,, ...	$\frac{2}{3}$ to 1	56·19	46·41	1·803	2·062	1·500
Gothic roof ...		60·	50·56	2·000	2·236	1·732
Rise = span ...	$\frac{1}{2}$ to 1	63·27	54·44	2·237	2.449	2·000

Roofs.—To obtain the length of the rafter and hip of a square roof, with a pitch of 1 to 1, from the above table. Assuming the half span to be 13ft., then the rafter will be 1·414 x 13=18·38, or 18ft. $4\frac{5}{8}$ins., the hip rafter being 1·732 x 13=22·52=22ft. $6\frac{1}{4}$in.

ONE DAY'S WORK FOR 2 CARPENTERS.

Labor of 2 men. Marking out and **cutting** 18 squares, 4 hip roofing, cottage, 1 day.
"Striking" or fixing 4 x 2 rafters, 7 x 1 hips and ridges of roofing, 1 day.
Staying with 4 x 3 purlins and 3 x 2 struts and collarties, 1 day.
9in. Fascias 2ft. soffit on bracketing, fit same around, 1 day.
Filling in hip and valley and chimney boards, or gable studs, and minor necessary work. 1 day.
5 days' work for Cottage Roof at £2½ per day each = £25 net.
Add for profit, waste, materials, nails and incidentals.

SETTING OUT ROOFS BY SCALE DRAWING.

The best scale to use in setting out a roof is $1\frac{1}{2}'' = 1$ foot, but except in small roofs, the drawing will not fit on the drawing board. It becomes necessary then to use $1'' = 1$ foot. This will be found sufficiently accurate for practical purposes.

Materials required :—Drawing board, tee square, set square, scale rule, a fairly hard pencil and rubber.

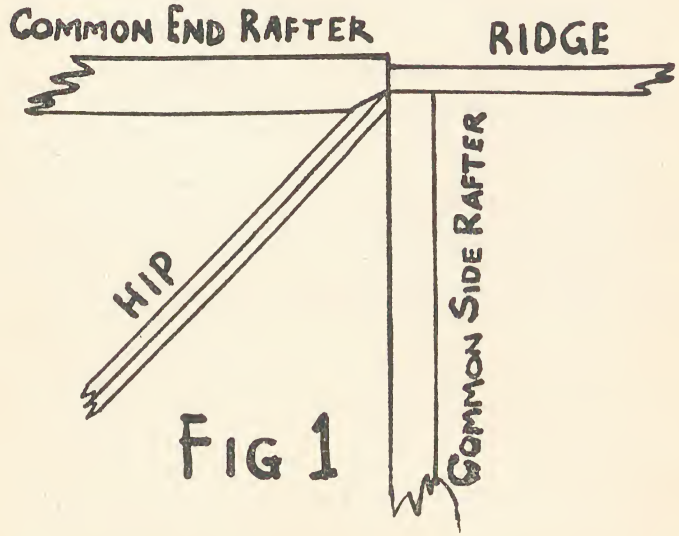
Preliminary.

The basic principle in setting out a roof is to set up each section of the roof as a **right angle triangle.** Measurements and angle cuts are taken from these triangles. Figures 2, 3 and 4 are shown here as separate drawings for simplicity of explanation, but in actual practice they are set up on a common base line and perpendicular line. Thus the three drawings would appear as superimposed one on top of the other.

The example shown is a hipped roof on a building 36 feet long by 24 feet wide with a vertical rise in roof of 8 feet.

The timber dimensions are as follows :—Rafters $4'' \times 2''$, hips $1''$ thickness, ridge $1''$ thickness and rafter spacings at $18''$ centres.

The setting out is done by single lines, but when dealing with rafters, hips, valleys and ridges the actual thicknesses of the materials must be taken into account.



Plan of Intersection of Hip with Ridge.

As an example of this, in Fig 1 the true intersection line of the hip rafters or " creepers " lies along the centre of the hip, but if the creepers were cut to this line, they would be too long, because half the thickness of the hip extends beyond this line on each side.

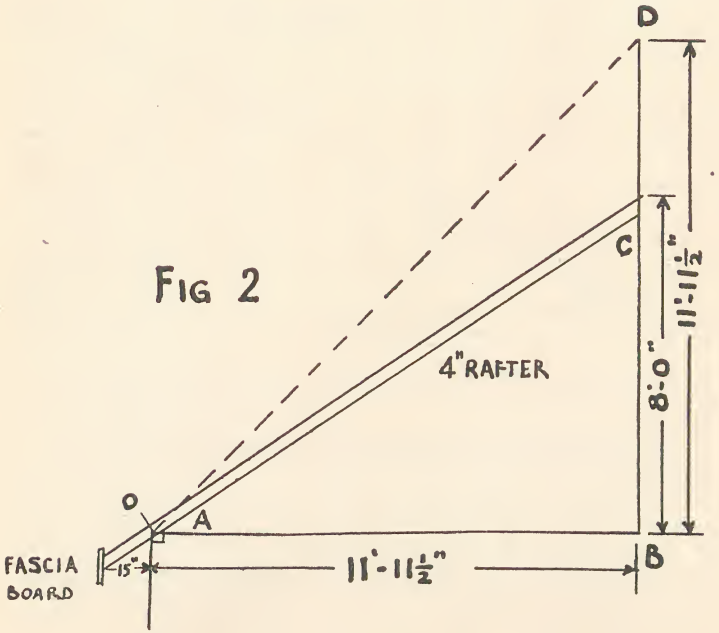
The length of the ridge is obtained by deducting the width of the building from the length and **adding** the thickness of the ridge. Thus 36′—24′+1″ = 12ft. 1in. This extra inch is added to the ridge length because, as will be seen when setting out, the common rafters are cut to cover 11′ 11½″ horizontal cover of roof instead of 12 feet, to allow for the thickness of the ridge.

This would make the end common rafters ½″ short (square off) at each end of the ridge. In practice the ridge is usually left a trifle longer, and the last pair of common rafters eased out, if necessary, to intersect correctly with the end common rafter. The end common rafter is **not** cut longer than the side rafters to make up this extra ½ inch.

After the correct intersection has been made as described above everything is correct for the **centre line** of the hip to intersect at the corner of the ridge and side rafter. (See Fig. 1).

The end common rafter is sawn or chiselled at an angle along the top plumb cut to take the cut of the hip. (See Fig. 1).

Setting Out Common Rafters—Fig. 2.



Draw a base line near the bottom of the drawing paper and set up a line at right angles to it near the right hand side of the paper. Set out on the base line, the line A B equal to half the width of the building less half the thickness of the ridge.

In the example chosen this would be 11′11½″. Set out the line BC equal to the vertical rise of the roof = 8 feet.

Measure 3″ from the corner of the wall plate at right angle to the slope or inclination of the rafter. Call this point O.

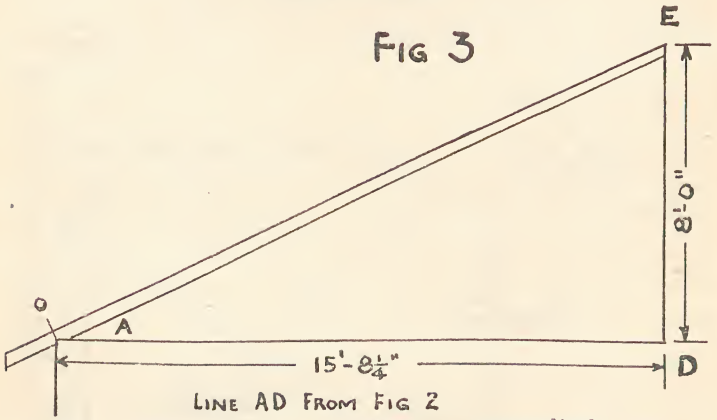
This gives 1 inch birdsmouth in the 4″ rafter. Join the points CO and produce the line for the overhang of the rafter.

The measurement CO gives the length of the common rafters to the **square off the birdsmouth.** All measurements are taken to square off the birdsmouth, this being the practical method used.

The angle BCO is the plumb cut of **all the rafters** including creepers and valley rafters. For the overhang of the rafters (say 15 inches) measure 15″ square off the wall and draw a perpendicular line to cut the rafter. This is the inside of the fascia board and the overall length of the rafter can be obtained by measuring from the point C to the inside of the fascia board.

The exact pitch of the roof and/or the overhang should be adjusted to take complete tiles or other roof coverings without cutting the top row of tiles etc.

Setting Out Hips.



Set out the line AB—11′–11½″ on the perpendicular line BD (Fig. 2).

Join the line DA and measure the length with the scale rule.

Transfer this length to the base line at AD (Fig. 3). This measures 15′–8¼″.

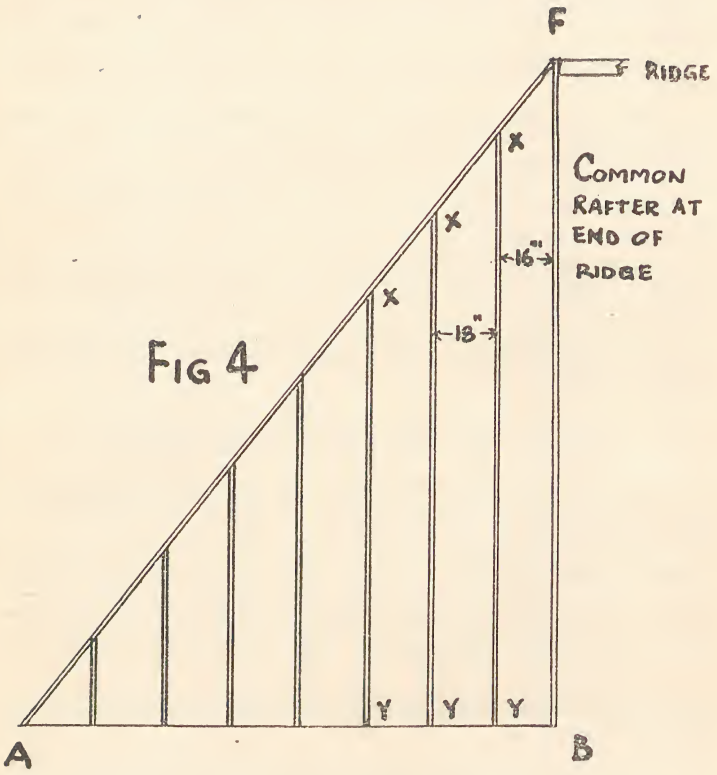
Set out the line DE equal to the vertical rise of the roof = 8 ft.

Join EO and produce. The point O is 3″ **square off** the corner of the wall plate as previously explained.

The length EO is the length of the hip to **square off** the birdsmouth.

The angle DEO is the plumb cut of the hip. The hip is usually left uncut at both ends. The top is cut when fitting in place and the overhang is cut to line with the ends of the rafters when in position.

Setting Out Creepers



Set out the base line AB (11′–11½″) still half the width of building less half the thickness of the ridge.

Set out the perpendicular line BF equal to the length of the common rafter from square off the birdsmouth. This length is CO from Fig. 2.

Join the line A F and draw a line parallel to it half an inch away (by scale) on the inside of the triangle. This allows ½″ for half the thickness of the hip timber. This line is the line of intersection for the creepers and not the line AF. The angle BFA is the " creeper " cut of the hip and valley rafters, but the plumb cut is the same as the common rafters.

For 18″ centres the first and longest creeper will be set out 16″ from the line BF to obtain the **Long Point Measurement.** Creepers are measured from the long point. It will be seen from Fig. 4 that the 16″ is the " in between " measurement from the common rafter at end of ridge.

The rest of the creepers will be set out 18″ centres from the longest creeper.

The length of each creeper will be measurement XY from long point to square off the birdsmouth in each case. The overhang, of course, is the same as for the common rafters.

In practice sometimes the average " diminish " in length of the creepers is taken and marked out on the longest creeper and this is used as a template to cut all the creepers.

The example of setting out shown, is for the building mentioned at the beginning. Any different thicknesses of hips, ridges, valleys and rafter spacings must be taken into account when setting out.

The valley rafters have the same creeper cut as the hip rafters but are cut with the long point at the lowest part of the rafter, the underneath side.

SETTING OUT ROOFS—THE STEEL SQUARE.

One of the most essential tools in the carpenter's kit bag is the steel square. The use of the steel square in setting out a roof is by far the easiest and most accurate method.

The steel square eliminates the laborious method of drawing roof to scale or laying out rafters on the ground to obtain cuts and lengths of, rafters etc. All the necessary lengths, plumb cuts, mitre cuts, birdsmouths of rafters, hips, valleys and creepers can readily be obtained with the steel square.

The steel square is simple to use and it is not necessary to have a knowledge of higher mathematics to set out the most difficult roof in building construction.

The square is accurately made of polished steel, consisting of the " Body," which is 24″ long and 2″ wide and the " Tongue," usually 16″ long and 1½″ wide. These blades are set at a right angle (90°), and the point of intersection is called the " heel ". The blades are stamped with " scales " and " rafter tables," enabling the carpenter to obtain rafter lengths for any span or " pitch " of roof with the greatest of ease and accuracy.

Instruction booklet is issued with each steel square and when familiar with its use many other setting out problems can be quickly and accurately solved, thus saving time and labour.

The steel square as well as all roofing is based on the principles of a right-angle triangle. The base and perpendicular height of a right angled triangle contain the right angle and the Hypotenuse is the third side of the triangle and is always opposite the right angle of the triangle. (For further information see advert., page 5).

ROOF COSTS.

In all examples of costs of roofs the naked structure is given separately and various coverings such as galvanised iron, tiles, asbestos cement, etc., are given per square to add to example of costs of naked structure.

These coverings will be found under their respective headings.

Cartage for 5 miles included in costs.

Example No. 1—Rafters Spaced—18″ Centres—4 x 2 —Per square. Hardwood

	£	s.	d.
4 x 2 H.W. Rafters—8/10—54 super ft. at 86/9 per 100 super	2	6	10
4 x 3 H.W. Purlin—1/10—10 super ft. at 86/9 per 100 super		8	9
6 x 1 H.W. Ridge—1/10—5 super ft. at 89/3 per 100 super		4	6
7 x 1 H.W. Hips average 1/6 } 1/18—10 super ft. 7 x 1 H.W. Valleys average 2/6 } at 89/3 per 100 super		8	11
4 x 2 H.W. Struts, braces, collar ties—1/20—14 super ft. at 86/9 per 100 super		12	2
Add freight surcharge—93 super ft. at 8/– per 100 super		8	0
Labour, nails for roofing, per square	1	17	0
Timber 93 super feet—Nett cost roof, per square ...	£6	6	2

Add lining, eaves, fascia board, shown later at per foot run. Add battens according to covering shown later. This applies to all examples.

For 2 storey work add 5/– per square extra for haulage, scaffold etc.

Add Profit and adjust cartage rates of timber.

1/3 per square for each 10 miles additional cartage.

Example No. 2—4 x 2 Oregon—Rafters spaced 18″ centres—Per square.

	£	s.	d.
4 x 2 Oregon rafters—8/10—54 super ft. at 138/3 per 100 super	3	14	8
4 x 3 Oregon purlins—1/10—10 super ft. at 138/3 per 100 super		13	10
6 x 1 Oregon Ridging—1/10—5 super ft. at 139/3 per 100 super		7	0
7 x 1 Oregon Hips, Valleys—1/18—10 super ft. at 139/3 per 100 super		13	11
4 x 2 Oregon Struts, braces, collar ties—1/20—14 super ft. at 138/3 per 100 super		19	9
Labour, Nails to roof per square	1	13	6
Timber 93 super feet—Nett cost per square	£8	2	8

Add Oregon fascia, lining, eaves, etc., at per foot run, shown later.

Add cartage 1/– per square for each 10 miles extra.

Example No. 3 — 5 x 2 H.W. Rafters—Per square.	£	s.	d.
5 x 2 H.W. Rafters—8/10—66 super ft. at 86/9 per 100 super	2	17	10
4 x 3 H.W. Purlins—1/10—10 super ft. at 86/9 per 100 super		8	9
6 x 1 H.W. Ridge—1/10—5 super ft. at 89/3 per 100 super		4	6
7 x 1 H.W. Hips, Valleys—1/18—10 super ft. at 89/3 super		8	11
4 x 2 H.W. Struts—1/20—14 super ft. at 86/9 per 100 super		12	3
Add freight surcharge, 105 super ft. at 8/– per 100 super		8	6
Labour and nails	1	16	0
Timber, 105 super feet—Nett cost per square	£6	16	9

Add 2/– per square for each 10 miles additional cartage.

FLAT ROOFS.

The cost of the naked roof is shown first, floored ready to take asphalt or bituminous felt coverings as the case may be. The cost of these coverings is shown separately, to be added to the appropriate example of cost.

Example No. 4—6 x 2 H.W. Joists—Spaced 18″ centres—Per square.	£	s.	d.
6 x 2 H.W. Joists—8/10—80 super ft. at 86/9 per 100 super	3	9	6
4 x 1 T. and G. H.W. floor—120 super ft. at 102/3 per 100 super	6	2	9
Add freight surcharge—200 super ft. at 8/– per 100 super		16	0
Labour laying joists		18	0
Labour laying floor and nails		19	0
Timber, 200 super feet—Nett cost per square	£12	5	3

Add 2/6 per square for each 10 miles additional cartage.

Mastic asphalte $\frac{3}{4}$″ thick at 25/– per sq. yd—Add per square	£11	13	4
Mastic asphalte 1″ thick at 30/– per sq. yd—Add per square	£13	17	8

See " Asphalte ".

Bituminous felt 3 ply at 2/4 per sq. yd. Laying 3/6 yd. Add per square	£3	5	0
Bituminous felt 5 ply at 2/10 per sq. yd. Laying 3/9 yd. Add per square	£3	13	3

	£	s.	d.
Eaves lining soffit—Per 100 feet run—15″ horizontal overhang			
8″ x 1″ Fascia 100 lin ft. at 1/2 per lin ft.	5	16	8
3″ x 2″ H.W. Nailed to rafters and wall—42 super ft. at 93/9 per 100 super	1	19	6
Asbestos cement sheets cut to 15″ wide—14 sq. yds. at 3/4 per yd.	2	4	4
1″ ovolo mould and fixing—100 lin. ft. at 3d. ft. ...	1	6	8
Labour fascia, 4d. ft.; trimmer joists, 4d. ft.; sheets cutting and fixing, 5d. ft—100 ft. at 1/1	5	8	4
Cost, 3/4 per foot run—Total for 100 ft. run	£16	15	6

Eaves Lining.

Another method of lining eaves is to groove the back of the fascia $\frac{1}{4}$″ deep to take the edge of the asbestos cement sheet and cutting off the bottom point of the rafters flush with the top of this groove. Nail a dressed 2″ x 1″ batten along wall of building level with bottom of groove. Fix the sheet into the groove and allow the sheet to fall into position on top of batten. Nail the sheet into batten from above.

	£	s.	d.
Example No. 2—Per 100 ft. run—12″ horizontal overhang.			
6 x 1 Oregon fascia = 100 lin. ft. at 11d. ft. run	4	12	0
2 x 1 H.W. Dressed batten = 100 lin. ft. at 2d. ft. run...		16	8
Asbestos cement cut 12″ width, 12 yds. at 3/4 yd. ...	2	0	0
Labour fascia, 4d. ft.; cutting sheets and fixing, 5d. ft.; = 100 ft. at 9d. ft.	3	15	0
Cost 2/3 per foot run—Nett cost per 100 ft. run ...	£11	3	8

Allow extra for ventilators 3/– each fixed.

COTTAGE HARDWOOD STEPS.

Example No. 1—3 Feet Wide—Tread 11″, Rise 7½″, 12 treads, Rising 7′ 6″—Two handrails 4 x 2 on flat dressed and rounded.

	£	s.	d.
DAR H.W. Strings 9″ x 2″—2/15 = 45 super ft. at 97/3 per 100 super	2	3	10
DAR H.W. Newels 4″ x 4″ at top 2/4′ 6″ = 12 super ft. at 97/3 per 100 super		12	1
DAR 4 x 3 Supports to handrail 4/4′6″ = 18 super ft. at 96/– per 100 super		16	7
DAR 3 x 2 H.W. on flat spaced 1″ apart—36/3 = 54 super ft. at 95/– per 100 super	2	11	6
DAR 4 x 2 H.W. rounded handrail—2/12′0″ = 16 super ft. at 96/– per 100 super		16	0
Labour and nails, 26 hours at 6/– per hour	7	16	0
Add freight surcharge—147 super ft. at 8/–		12	0
Timber, 147 super feet—Nett cost 12 treads	£15	8	0

Nett cost per tread = £1 5s. 8d.

Cottage Hardwood Ramp—3 feet wide—Rising 3 feet in 11 feet slope measurement.

	£	s.	d.
H.W. 4 x 2 Bearers—3/11 = 22 super ft. at 86/9 per 100 super		19	3
H.W. 4 x 4 Newels dressed—2/4′6″ = 12 super ft. at 88/– per 100 super		10	8
H.W. 4 x 2 Dressed and rounded handrail on flat—2/11 = 15 super ft. at 96/– per 100 super		14	4
H.W. 4 x 3 Dressed Supports for handrail—4/4′6″ = 18 super ft. at 96/– per 100 super		16	7
H.W. 3 x 2 On flat spaced ¾″ apart—38/3 = 57 super ft. at 95/– per 100 super ft....	2	16	9
Labour dressing and erecting 14 hrs. at 6/–	4	4	0
Add freight surcharge—124 super ft. at 8/–		10	0
Timber 124 super feet—Nett cost 11 feet ramp	£10	11	7

Nett cost per foot run = 19/3.

Park Rail Fencing for 50 lineal feet.

	£	s.	d.
DAR H.W. Posts 5 x 2—6/4 = 20 super ft. at 93/6 per 100 super ft.		18	9
DAR H.W. top rail 4 x 2—50 lin. ft.=33⅓ super ft. at 93/6 per 100 super ft.	2	6	9
Fencing wire, 10 gauge gal., 2 rows = 15 lbs at 3d. ...		3	9
Creosote, nails, etc., and labour on creosote		10	0
Cartage, 53⅓ super ft. at 2/6		1	5
Add freight surcharge—53 at 8/– per 100 super ft. ...		4	3
Labour digging holes, erecting fence in normal soil = 50 lineal feet at 1/8	4	3	4
Nett cost for 50 lineal feet	£8	8	3

Nett cost per lineal foot, 3/5 or nett cost per rod, £2 15s. 0d.

Front fencing chain wire panels for 50 lineal feet less 8 ft. gate— 42 lin. ft.

	£	s.	d.
DAR H.W. Posts 5 x 3—3/4 = 15 super ft. at 93/6 per 100 super ft.		14	1
DAR H.W. inter. posts 5 x 2—4/4 = 13 super ft. at 93/6 per 100 super ft.		12	2
DAR H.W. Rails 4 x 2—12/7 = 56 super ft. at 93/6 per 100 super ft.	2	12	5
Chain wire 2ft. wide, 2in. mesh, 10 gauge, 42ft. at 11d.	1	18	6
Labour Fixing 42ft. at 6d.	1	1	0
Creosote, nails, etc., and labour creosote		10	0
Cartage—84 super ft. at 3/–		2	7
Add freight surcharge—84 super ft. at 8/–		6	9
Labour digging holes, erecting fence in normal soil = 42 lineal feet at 2/9	5	15	6
Cost 6/7 per foot run—Nett cost for 42 lineal feet ...	£13	13	0

Add Tubular Steel Gates—8ft, £7. Fixing 15/–.

Paling Fence—5ft. High—100 Lineal Feet.	£	s.	d.
H.W. Rails 3 x 2 = 210 lin. ft. = 105 super ft. at 83/3 per 100 super	4	7	5
H.W. Posts 5 x 2 = 12/7 = 70 super ft. at 84/3 per 100 super	2	19	0
H.W. Posts 5 x 5 = 2/7 = 30 super ft. at 85/6 per 100 super	1	5	8
H.W. Whales 6 x 1 = 24/1'6" = 18 super ft. at 86/9 per 100 super		15	9
H.W. Struts 3 x 2 = 8/2 = 8 super ft. at 84/3 per 100 super		6	9
H.W. Soleplates 4 x 2 = 4/3 = 8 super ft. at 84/3 per 100 super		6	9
H.W. Palings 5 ft. long, 4in. wide—300—at 71/6 per 100	10	14	6
Cartage on H.W. = 539 at 2/6 per 100 super ...		13	4
Add freight surcharge = 539 at 8/–	2	3	2
Nails and creosote and labour on creosote		15	0
Labour erecting fence, digging post holes in normal soil = 100 lin. feet at 1/8	8	6	8
Nett cost for 100 lin. feet	£32	14	0

Nett cost per foot, 6/7. Nett cost per rod, 109/–.

Add profit and adjust cartage rates of timber.

Paling Fence 6ft. High—100 Lineal feet.	£	s.	d.
H.W. Rails 3 x 2 = 210 lin ft. = 105 super ft. at 83/3per 100 super	4	7	5
H.W. Posts 5 x 2 = 12/8 = 80 super ft. at 84/3 per 100 super	3	7	5
H.W. Posts 5 x 5 = 2/8 = 33 super ft. at 85/6 per 100 super	1	8	6
H.W. Whales 6 x 1 = 24/2' = 24 super ft. at 86/9 per 100 super		19	0
H.W. Palings 6ft. long, 4in. wide = 300 at 76/– per 100	11	8	0
Cartage on H.W. = 542 at 2/6		13	9
Add freight surcharge = 542 at 8/–	2	3	6
Nails and creosote and labour on creosote		15	0
Labour erecting fence, digging post holes in normal soil = 100 lin. ft. at 1/10	9	3	4
Nett cost for 100 lin. feet	£34	5	11

Nett cost per foot = 6/11. Net cost per rod, 114/5.

6 ft. High Galvanised Iron Sheeted Fence for 100 Lineal Feet.	£	s.	d.
H.W. Posts 5 x 2—12/8 = 80 super ft. at 84/3 per 100 super ft.	3	7	5
H.W. Rails 3 x 2—200 lin ft. = 100 super ft. at 83/3 per 100 super ft.	4	3	3
Galvanised Iron 26 gauge, 6ft. No. 50 at 6/– each ...	15	0	0
Creosote, nails, etc., and labour creosote		15	0
Cartage, 180 super ft. at 3/– per 100 super ft.		5	6
Add freight surcharge—180 super ft. at 8/– per 100 super ft.		14	6
Labour erecting in normal soil—100 lin. ft. at 2/– per ft.	10	0	0
Cost 6/11 per foot run—Nett cost per 100 lineal feet ...	£34	5	8

If third or centre rail needed add 9d. per foot run.

Oregon picket front fence for 50 lineal feet less single and double gate 12ft. = 38 Lineal feet.	£	s.	d.
DAR Oregon S.M. Posts 4 x 4—8/5 = 53⅓ super ft. at 151/3 per 100 super ft.	4	1	8
DAR Oregon S.M. Rails 3 x 2—10/8 = 40 super ft. at 151/3 per 100 super ft.	3	0	6
Dressed and Chamf. Mahogany pickets—320 ft. at 46/–	7	7	4
Creosote, nails, etc.		10	0
Cartage—200 super feet at 1/6 per 100 super ft. ...		3	0
Labour digging holes in normal soil and erecting 38 lin. ft. at 2/6	4	15	0
Cost 10/6 per foot run. Nett cost for 38 lin. feet ...	£19	17	6

Add Gates, Fixings and Hanging.

APPROXIMATE WEIGHT OF METALS.

12 inches square, 1 inch thick, and Melting Points in Degrees Centigrade.

	Weight lb.	Melting point.
Aluminium (cast)	13·33	657
Brass (cast)	42	895
Copper	46·4	1085
Gold	100	1065
India rubber (good)	8	—
Iron (cast)	37·5	1505
„ (wrought)	40	—
Lead	59·2	327
Mercury	70·8	—
Nickel	45·7	1451
Oak	4·83	—
Platinum...	111·8	1755
Silver	54·6	961
Steel (mild)	40·8	—
Tin	38·5	232
Water	5·2	—
Zinc	36·4	420

TYPICAL GARAGE—QUANTITIES AND COST.

For a typical garage 18ft. long 12ft. wide overall and 7ft. high, plus ¼ pitch roof, 12″ eaves overhang, one line of nogging, 4 x 2 plates and studs, 3 x 1 braces, 4 x 4 corner and doorstuds (front only), 4 x 2 rafters, ceiling joist (to alternate rafters only) 6 x 1 ridge.

Concrete floor & painting not included.

			£	s.	d.
4″ x 2″ H.W. Plates—4/18′ 4/12′	= 80 super ft.				
4″ x 2″ H.W. Studs—29/7′	= 135⅓ ,, ,,				
4″ x 2″ H.W. Ceiling joists—5/12′	= 40 ,, ,,				
4″ x 2″ H.W. Rafters—26/8′	= 138⅔ ,, ,,				
	394 ,, ,, at 84/3		16	17	0
4″ x 1½″ H.W. Nogging—2/18′ 1/7′	= 21½ ,, ,,				
4″ x 4″ H.W. Corner studs—6/7′	= 56 ,, ,,				
	77½ ,, ,, at 85/6		3	6	4
3″ x 1″ H.W. Braces—4/12′ 2/9′	= 16½ ,, ,,				
6″ x 1″ H.W. Ridge—1/18′	= 9 ,, ,,				
3″ x 1¼″ H.W. Battens—8/18′	= 45 ,, ,,				
	70½ ,, ,, at 86/9		3	0	9
Extra for selected lengths ...	= 542 ,, ,, at 3/6			19	3
Cartage	542 ,, ,, at 2/6			13	9
Add freight surcharge ...	= 542 ,, ,, at 8/–		2	4	0
Nails, etc.				10	0
3/16″ A.C. wall sheeting = 49 sq. yds. at 2/4½			5	16	5
2″ x 2″ A.C. Ext. angle mould = 30 feet at 23/– per 100 ...				6	11
2″ A.C. Horizontal mould = 50 feet at 21/– per 100 ...				10	6
2″ A.C. Cover strip = 50 feet at 12/6 per 100				6	3
Add 40% surcharge to A.C. above			2	16	0
Weather strip = 50 feet at 1½d. ft.				6	3
Fibro nails etc.				10	0
Door at side 6′8″ x 2′8″ Incl. Architrave = 1 at			5	6	0
Double Doors at front, 7′0″ x 8′0″, Incl. Architrave = 1 at			13	4	0
Window approx. 4′ x 3′ Incl. Architrave = 1 at			5	5	0
4″ Gal. Iron quad. eaves gutter = 42ft. at 2/6 per 6ft. ...				17	6
3″ Gal. Iron Round Downpipe = 18ft. at 3/– per 6ft. ...				9	0
26g. Gal. Iron Edge Roll = 32ft. at 2/8¼ per 8ft.				10	9
26g. Gal. Iron 14″ Ridging = 18ft. at 3/6 per 6 ft.				10	6
			£64	6	2
26 gauge Gal Iron Roof sheeting = 20/8′ at 6/7 per sheet ...			6	11	8
26 gauge Gal. Iron Sheet flashing = 1 sheet at 6/– per sheet				6	0
Astrigals and gutter brackets				8	0
Roof screws or nails, etc.				5	0
			£71	16	10

Labour to Garage.

	£	s.	d.
Carried forward	71	16	10
Setting out, cutting and framing = 1 week	11	0	0
Covering walls including cover strip = 2½ days	5	10	0
Fit doors and windows = 1½ days	3	6	0
Eaves, gutters and downpipe = 1 day	2	4	0
Roofing = 1½ days	3	6	0
Nett cost (without floor and painting)	£97	2	10

GLASS LOUVRE OPENINGS.

Estimation of Cost of Various Openings.

Divide the length of the opening into sections not exceeding 37½″ each, providing for dividing uprights not less than 1″ thick and 3″ wide. This is done by deducting the combined thicknesses of all the uprights from the overall length. Divide this remaining length into the number of openings required and deduct 1½″ from each section for space required by fittings and clearance. The remainder gives the length of glass for the louvres.

Example of Costs—Fittings only.

Height Overall Ft. Ins.	No. of Blades	Cost of Fittings.				Approx. Labour Per Set Inc. Glass
		Zinc Anneal		Aluminium		
		Single	Dual Control	Single	Dual Control	
1 5½	3	9/1	—	12/3	—	5/6
1 11	4	11/1	—	14/9	—	6/6
2 4½	5	13/–	—	17/3	—	7/9
2 10	6	14/2	—	20/6	—	9/–
3 3½	7	16/3	—	23/–	—	10/–
3 9	8	18/2	—	25/9	—	11/–
4 2½	9	20/2	24/1	28/3	32/–	12/6
4 8	10	22/1	26/–	30/9	34/6	13/6
5 1½	11	24/–	27/2	33/6	37/9	14/6
5 7	12	26/–	28/4	36/6	41/–	15/6
6 0½	13	28/1	30/5	39/3	43/6	16/–

Approx. Cost of Glass Louvre Blades—Per Foot Run.

White Fancy	3/16″ Rough Cast	¼″ Wired	Moderne Fluted	3/16″ Cold-lite	3/16″ Crystaline	¼″ Crystaline	3/16″ Clear	3/16″ English Plate
1/3	1/4	1/6	1/7	1/9	1/9	1/10	1/8	2/5

Example of estimating cost of Opening Complete.
Zinc-Anneal Fittings—glazed with $\frac{3}{16}$″ Crystaline glass.
Daylight size of opening—10′11½″ x 3′9″ high—4 sections.
Opening 10′11½″—3 Studs 1¾″ each = 10′6″.
10′ 6″÷4 sections = 2′7½″ per section.
2′7½—1½″ for fittings = 2′6″ Glass length.
Height 3′9″ takes 8 Louvre Blades—(from table).

Example of cost—Per Section.	£	s.	d.
1 set of Zinc-Anneal Fittings at 18/2 each		18	2
Labour Fixing Fittings and Louvres		11	0
8 Crystaline Blades = 20 feet at 1/9 per foot	1	15	0
Nett cost of 4 sections, £12 16s. 8d. Nett cost per section	£3	4	2
Add Timber Framing—oncosts and profit.			

Note :—Dual control units are available where the unit exceeds 8 blades. These units allow one portion of window to be closed and the other left open as desired.

For further information and quotes see advertisement page 73.

PLUGGING.
Raking Out, Plugging and Sawing Off.

Raking out walls, making plugs, plugging walls and sawing plugs flush with plaster, takes about 4 hours to do a room 12′ x 10′. This includes skirting, picture rail and one window and is approximately 100ft. run of plugging. Brickwork in lime, mortar and plugs spaced 18″ apart.

Example of cost—Per 100ft. run of Plugging.	£	s.	d.
Labour.—Raking out, plugging and sawing etc.— 4 hours at 6/-	1	4	0
Add 80 Plugs		6	0
Nett cost per 100ft. run	£1	10	0

Cost = 4d. per foot. Old work and cement joint = 4½d. per foot.

"PLUGGING AND FIXING"
Rawlplug Modern Fixing Technique.

The modern method for all fixings normally made with a wood or coach screw, is a scientific one which is the Rawlplug method, whereby the expansion obtained from the screw when inserted into a Rawlplug of the correct size (which is always smaller than the diameter of the screw head), gives a fixing of great and maximum strength. By this method, time, labour and cost are saved, and there is no resultant damage to the material in which inserted. There is no making good to be carried out, and the entire job is completed as soon as the screw is screwed home.

There is a Rawlplug to suit all sizes of wood screws, from No. 3 to No. 30, and coach screws from ¼″ up to ¾″ diameter. A No. 28 Rawlplug with a ⅝″ coach screw, will withstand a direct pull of over 4 tons—other sizes pro rata.

Rawlplug Outfits.

Popular Outfit.—30 Rawlplugs No. 8 assorted lengths, Toolholder and Drill, Screws, etc.

Household Outfit.—75 Rawlplugs No. 8 assorted lengths, No. 8 Holders for brick and concrete, etc., Screw, nails and hooks.

Handyman Outfits.—Larger than above.

Craftsman's Outfit.—Larger than above.

Technician's Outfit.—Contains Rawlplugs.

10 3 x ½″, 20 3 x ¾″, 12 3 x 1″, 10 6 x ¾″.
20 6 x 1″, 10 6 x 1½″, 10 8 x ¾″, 10 8 x 1″.
10 8 x 1½″, 10 10 x ¾″, 10 10 x 1, 10 10 x 1½″.

No. 8 Holder, Nos. 3, 6, 8, 10/8 Jumping Bits.

No. 1 Ejector, Screw Gauge etc.

Rawlplug Refill Outfit—6 each No 8 Rawlplugs, 1″ & 1½″, 6 each No. 8 Screws, 1″ & 1½″

For Heavy duty fixings, using metal threaded bolts suitable for fixing heavy machinery or other appliances to hard, solid, and/or hollow materials, there are Rawlbolts, Bolt Anchors, and "H" Toggles, all of which are dry fixings, for which no grouting-in is required, while for new work, where positions are known at time of pouring concrete, there are Rawlplug Cement-in Sockets.

In hollow or thin materials exceeding the above maximums, Rawlplugs " G " or " H " Type Gravity Toggles may be used, and for lathe or plaster work, there is the Rawlplug Spring Toggle. In each case, holes are required right through the material having the following diameters. " G " Toggles—⅜″, " H " Toggles (all sizes of Coach Bolts from ¼″ up to ¾″) a clearance diameter for the Bolt Head, and for Spring Toggles—½″.

For steel framed buildings, use the Rawlplug Rawlclip, as this avoids drilling the girders. Available in two adjustable sizes to fit all R.S.J. sections from 3″ up to 6½″, and also angle sections.

Concrete or Heavy Duty Fixing Devices.

Fixing Machines to Concrete Base.

By far the simplest method of fixing machines to concrete, is by the simple Loose Bolt Rawlbolt method. The saving in labour cost more than pays for the actual fixing itself, and the machines concerned can be in production within a few minutes of completion of the speedy hole boring operation. There are no days to wait for grout to set, as there is with the Rag Bolt method.

The loose Bolt Rawlbolt consists of a shell made up of four segments of malleable iron, in which at the base is housed a specially shape conical nut. A standard Whitworth Bolt is used in conjunction with this shell, and the action of tightening up the Bolt with an ordinary spanner after inserting the shell into its hole, causes the conical nut to expand the base of the shell segments against the walls of the hole with a vice like grip.

The length of the Rawlbolt Shells for each bolt size is such that in good quality concrete, the resulting strength of the fixing is equal to the bolt itself. In weaker materials, this result can also be obtained by boring deeper holes, and making up the extra length by means of Rawlplug Distance Collars placed on top of the shells.

Rawlbolts only require a neat round hole of a diameter to suit the shell diameter of the bolt size to be used. Hand or Power Drills for each of these sizes are available. The positions of the necessary fixing holes are easily marked out with sufficient accuracy, the holes bored, and the shells with the bolts removed therefrom inserted therein before the machine is placed in position. The machine, no matter what its weight may be, can then be moved into position (on rollers if necessary), the bolts then passed through the fixing holes in its base, and into the Rawlbolt shells. Upon tightening these up, the job is completed, and the machine can at once be started up.

PLUGGING AND FIXING.

Rawlplug Prices.

Rawlplug Size	Diam.	Rawlplug Length.				
		½″	¾″	1″	1½″	2″
		Box of 100 Plugs.				
3	—	3/6	3/9	4/–	—	—
6	5/32″	3/6	4/3	5/–	—	—
8	3/16″	—	5/–	6/–	7/6	8/6
10	7/32″	—	—	6/9	8/6	10/–
12	¼″	—	—	7/9	9/6	11/–
14	9/32″	—	—	—	11/6	13/9
		Box of 50 Plugs.				
16	5/16″	—	—	—	—	9/–
18	11/32″	—	—	—	—	10/6
20	⅜″	—	—	—	—	12/–
		Box of 25 Plugs.				
22	7/16″	—	—	—	—	9/–

Durium Drills—Cost Each.

Sizes 5/32″, 3/16″, 7/32″ and ¼″, 12/6; 9/32″, 13/6; 5/16″, 14/6; ⅜″, 15/–; 7/16″, 22/–; ½″, 24/–; 5/8″, 32/–; ¾″, 40/–; ⅞″, 56/–; 1″, 56/–.

Jumping Bits—Per Dozen.

Size 3, 9/–; 5/32″, 10/–; 7/16″, 54/–; ½″, 69/–; 5/8″, 105/–; ¾″, 156/–.

Hammer Bits—Per Dozen.

Sizes 3, 17/–; 5/32″, 20/–; 3/16″, 21/–; 7/32″, 22/–; ¼″, 23/–; 9/32″, 25/–; 5/16″, 31/–; 11/32″, 35/–; ⅜″, 38/–.

Holders—Per Dozen.

Size 3/16″, 45/–; 9/32″, 60/–; ⅜″, 7/16″, ½″, 5/8″ and ¾″, 96/– each.

EXPANDING BOLT SHIELDS.

Size	Price per 100	Drill Required	Drill and Holder Price each
$\frac{3}{16}$″	120/–	No. 16	7/7
$\frac{1}{4}$″	78/9	22	12/6
$\frac{5}{16}$″	116/4	26	16/9
$\frac{3}{8}$″	142/6	$\frac{3}{4}$″	13/–
$\frac{7}{16}$″	195/–	$\frac{3}{4}$″	13/–
$\frac{1}{2}$″	217/6	$\frac{7}{8}$″	14/6
$\frac{5}{8}$″	450/–	$1\frac{1}{4}$″	22/6

BOLT ANCHORS.

Size	Price per Doz.	Drill Required	Drill and Holder Price each	Caulking Tool each
$\frac{3}{8}$″	27/–	$\frac{7}{8}$″	14/6	6/6
$\frac{1}{2}$″	42/–	$1\frac{1}{8}$″	18/6	8/9
$\frac{5}{8}$″	45/–	$1\frac{3}{8}$″	24/–	9/6
$\frac{3}{4}$″	48/–	$1\frac{5}{8}$″	26/–	10/6
1″		2″		11/6
$1\frac{1}{4}$″	72/–	$2\frac{1}{2}$″		12/6

Popular Outfits	54/– Doz.	Screwanchors	8 x 1 19/– per 100
Household ,,	132/– ,,	,,	8 x $1\frac{1}{2}$ 21/– ,,
Handyman ,,	204/– ,,	,,	10 x 1 20/– ,,
Craftsman ,,	222/– ,,	,,	12 x $1\frac{1}{2}$ 22/– ,,
Mechanical Hammer	104/– Each.	,,	14 x $1\frac{1}{2}$ 25/– ,,
		,,	14 x 2 29/– ,,
Breast Adapter	8/6 ,,		
Toggle Bolts	6/6 Doz.	Rawldrives	8 x $1\frac{1}{2}$ 6/– ,,
Rawlanchors	5/– ,,	,,	10 x 1 5/6 ,,
Plastic Wood	16/– ,,	,,	12 x $1\frac{1}{2}$ 6/– ,,
Durofix	16/– ,,	Rawlhooks	1 & 2 15/9 Doz.

Wall Boring Tools—18 inches length.

Size ...	¾in.	⅞in.	1in.	1⅛in.	1¼in.	1⅜in.	1⅝in.
Price ...	13/–	14/6	16/6	18/6	22/6	24/–	26/–

Ejectors—Per Dozen.

Size 1, 4/– ; Size 2, 6/– ; Sizes 3 and 4, 8/–

See Advertisement Pages 4 and 5.

VANDYKE PREFABRICATED HOMES.

Vandyke Brothers started as Builders of Cottage Homes in the year 1919, when Australia had just emerged from the first World War.

Although times were difficult steady progress was made and ten years later this young firm made a record by building nearly 100 Brick Homes in one year.

This remarkable achievement was partly made possible by the development of a method of prefabricating STANDARDISED COMPONENTS to suit all designs then erected by the firm. From this beginning Vandyke Brothers perfected the COMPLETELY PREFABRICATED HOME.

At the commencement of 1951 an output of 30 homes per week was a tribute to the efficiency and an indication of the quality of workmanship and design embodied in Vandyke Prefabs. Much thought and attention has been given to planning and design. The general result is a range of types to suit all tastes and families so that each home is individual and not standardised.

The construction of Vandyke Prefabs is acceptable to all Local Government Authorities and Financing Institutions. These homes appeal to the Owner-Builder as well as Building Contractors because of their simplicity in erection. There is an appreciable saving in skilled labour and most of the essential materials are supplied.

Vandyke Prefabricated Homes come to you ready to erect with floor timbers pre-cut, walls complete with doors, windows, ventilators, etc., where required, top and bottom plates, ceiling joists and roof ready to place in position. In fact, it involves no effort and every component just falls into position. Even pre-cast concrete floors are supplied for bathroom, laundry and wherever else these may be required.

Vandyke Brothers welcome inquiries from Builders and Homeseekers but regret that at time of writing it is not possible to make these homes available in any large numbers. It is hoped, however, that the position will improve and that very soon all home seekers may make a selection from the complete range of designs.

(See Advertisement on page 83.)

JOINER

Measurement.—In all superficial work such as floors, panelled ceilings, framed partitions, walls, &c., for "Labour and Nails," or "Labour only," take the full dimensions, including chimney breasts, doorways, windows and all spaces not covered, &c., which are not to be deducted, except the opening exceeds 36 superficial feet, when one-half the area only is allowed.

A GOOD DAY'S WORK FOR A GOOD TRADESMAN.

Set and bed 8 to 10 box frames, ordinary.
Fit and hang 7 to 10 window sashes.
Fit and hang 6 doors.
Fit, hang and lock 4 doors.
Set door jambs, 4 in. brickwork, 8 in. timber.
Fit and hang double slide doors, or fix track for one pair.
Fit and hang single slide doors, 2 pairs.
200 to 300 lin. feet plaster grounds.
100ft. good and 150ft. ordinary picture mould.
50ft. art shelf 4 x 4 and brackets, not including plugging walls.

For easy reference Joinery Timber Prices appear under respective headings. Average costs—labour only.

Plugging walls for skirting, picture rail—spaced 18″	...	4d. per foot.
Old walls and cement joints	...	4½d. per foot
Set of door jambs—plug and fix only	...	12/– each.
Fit, hang and lock door (ordinary)	...	12/– each.
Fixing only 1 set 4″ Architraves	...	6/– each.
Fixing only front door frame	...	12/– each.

GLASS DOORS (PAIRS)—UNGLAZED.
Clear Oregon—Square finish.

Door.	6·8 x 4·0 1½	6·8 x 4·0 1¾	6·8 x 4·6 1½	6·8 x 4·6 1¾	Remarks
5 Panels to each ...	93/6	98/6	113/9	120/6	Square fillets 14/3 extra.

FLY SCREEN DOORS (GALV. GAUZE) EACH.
Clear Oregon.

	2 Panel	4 Panel	2 Panel Bottom Braced	2 Panel Top gauze Bottom Wood
6–8 x 2–8 x 1¼ ...	42/9	46/3	46/3	49/6
6–10 x 2–10 x 1¼ ...	44/9	48/3	48/3	50/6

DOORS—EACH—UNGLAZED.

Clear Oregon—Square finish—Panelled Plywood.

Door.	6·8 x 2·6 $1\frac{1}{2}$	6·8 x 2·8 $1\frac{1}{2}$	6·8 x 2·8 $1\frac{3}{4}$	6·10 x 2·10 $1\frac{3}{4}$	Remarks and Extras
3 Panels ...	71/9	71/9	86/–	91/6	Top panel prepared for glass same price.
4 Panels ...	71/9	71/9	86/–	91/6	
3 Vertical Panels ...	67/9	67/9	80/6	85/9	
Single Panel	59/–	59/–	68/3	72/9	
3 Panel (top prepared for glass)	—	71/6	87/–	92/–	Square fillets 4/6 extra.
5Panel(whole prepared for glass)	—	52/6	63/9	68/–	Square fillets 7/3 extra.
Single Panel (whole prepared for glass) ...	—	48/–	57/3	61/6	
Framed, ledged (top prepared for glass)	—	94/–	104/9	110/–	
Framed, ledged ...	—	102/–	112/–	116/9	

GARAGE DOORS—PER PAIR—UNGLAZED.

Clear Oregon—Square finish.

Door.	6·6 x 7·6 $1\frac{3}{4}$	7·0 x 7·6 $1\frac{3}{4}$	7·0 x 8·0 $1\frac{3}{4}$
Two leaf, framed, ledged (top prepared for glazing) ...	15 2 3	15 18 3	16 4 6
Four leaf (ditto)	18 10 3	20 0 6	20 11 3
Ledged and Braced 1″ thick ...	11 0 6	11 11 3	12 3 0

Oregon Dowelled Doors :—6′–8″ x 2′–8″ x $1\frac{1}{2}$″—65/9 each.

Door Frames (Clear Oregon).

	Each
5 x 3 Solid rebated ($1\frac{1}{2}$ x $\frac{1}{2}$) up to 6′–10″ x 2′–10″ door size ...	55/6
1″ Storm Moulds extra	6/3

Jamb Linings (Clear Oregon).

	Per Set
4 x $1\frac{1}{2}$″, fin. $3\frac{3}{4}$ x $1\frac{1}{2}$″ Single rebated ($1\frac{1}{2}$ x $\frac{1}{2}$″) up to 6′–10″ x 2′–10″	26/3
5 x $1\frac{1}{2}$″, fin. $4\frac{3}{4}$ x $1\frac{1}{2}$″ Single rebated ($1\frac{1}{2}$ x $\frac{1}{2}$″) up to 6′–10″ x 2′–10″	30/6
6 x $1\frac{1}{2}$″, fin. $5\frac{1}{2}$ x $1\frac{1}{2}$″ Single rebated ($1\frac{1}{2}$ x $\frac{1}{2}$″) up to 6′–10″ x 2′–10″	35/–

Door and Casement Framing Material.

For 100ft. super — Oregon, 181/3; Pacific Maple, 178/6. Square rebated only — extra for moulded.

Packing Charges for Joinery.

Doors, Half crated	at 13/–	per package
Doors, Full crated	at 35/6	,, ,,
Fly Doors, Full crated	at 35/6	,, ,,
Fly Screens, up to 6 sq. ft. in area	at 13/–	,, ,,
Sashes, up to 6 sq. ft. in area	at 13/–	,, ,,
Sashes and Fly Screens, over 6 sq. ft.	at 2/–	per sq. ft.

DOORS AND FRAMES.

In estimating door and window openings the cost is calculated at per opening, including doors, frames, hinges, locks, architraves, etc., and labour. Various examples are given for usual stock doors. Any variation may be quickly added or deducted by reference to price list.

Example No. 1—Front Door Complete.

Door 6′–8″ x 2′–8″ x 1¾ Clear Oregon—5″ x 3″ Clear Oregon rebated 1¾ x ½″ frame with 1″ storm moulds—4″ x 1″ architraves—Lock and bell—top panel glazed figured — rolled glass.

Minimum Cartage Rate Included.	£	s.	d.
Oregon Door, 87/6. Square Fillets, 4/6	4	11	6
1 Pair 3½″ butt hinges and screws		1	6
1 Florentine Bronze Entrance Door Set (complete)	1	14	3
Bell		6	6
Labour—fit, hang, bell and lock door		18	0
5″ x 3″ Solid Rebated Oregon Door Frame	2	15	6
1″ Storm Moulds		6	3
Labour—fixing door frame—dowelled into threshold		12	0
18 feet 4 x 1 Oregon Architrave at 59/6		11	0
Fixing 1 set Architraves, 6/–; Nails 6d.		6	6
Plugging 18ft. at 4d. per foot		6	0
Glazing Top panel—figured rolled—tinted, 3 sq. ft at 2/–		6	0
Labour Glazing		2	6
Cartage		2	6
Nett cost of door	£13	0	0

For Threshold see "Terrazzo." Add profit, cartage and packing charges if required.

Fly Screen Door—To above.

Example No. 2.	£	s.	d.
6′–8″ x 2′–8″ Galvanized Gauze Door	2	6	3
Spring Hinges at 2/–		2	0
Handle		1	6
Labour—Fixing Complete		12	0
Nett cost—Fly Door	£3	1	9

Example No. 3—Internal Door Complete.

Clear Oregon Dowelled Door—6′–8″ x 2′–8″ x 1½—5 x 1½ Oregon Jambs. 4 x 1 Oregon Architraves—Lock Set complete.

	£	s.	d.
Dowelled Door—Oregon	3	5	9
Hinges		1	6
Mortice Lock Set—Bronze		13	0
Labour—Fit, Hang and Lock Door		12	0
1 Set Oregon Jambs	1	10	6
Plugging and Fixing Jambs		12	0
36ft. 4 x 1 Architrave at 59/6	1	2	0
Fixing 2 Sets Architraves—Nails		12	0
Plugging Walls 36ft. at 4d.		12	0
Cartage		2	6
Nett Cost of Door	£9	3	3

Add profit and extra cartage.

Example No. 4—Pair Casement Doors—Oregon.

6′–8″ x 4′–6″ x 1½″ Oregon Pair Doors in 5 x 3 Rebated Frame 1″ Storm Moulds—4 x 1 Architraves—Hinged and Locked. Each Panel Glazed Figured Rolled Glass.

	£	s.	d
One Pair Doors—Oregon	5	13	9
2 Pairs—Hinges		3	0
1 Lock set		12	0
1 Bolt		1	0
Labour—Fit, Hang and Lock Doors		18	0
5″ x 3″ Rebated Door Frame	2	19	0
1″ Storm Mould		7	0
Labour—Fixing Door Frame—Dowelled into Threshold		12	0
20ft. 4 x 1 Oregon Architrave at 59/6		12	0
Fixing Architraves—Nails		6	9
Plugging 20ft at 4d. per foot		6	9
Glass 18 sq. ft. at 2/–	1	16	0
Labour Glazing 8 sq. ft. Fig. Roll. Tinted at 1/3 ...		10	0
Cartage		2	6
Nett Cost—Pair Casement Doors	£14	19	9

For Square Fillets add 14/3 extra.

Example No. 5—1″ Braced Ledge Door.

4″ x 2″ Oregon Door Frame — 1″ Ledge Door—Rim Lock. Sizes 6′–6″ x 2′ x 6″ and 6′–8″ x 2′–8″.

	£	s.	d.
1″ Braced Ledge Door	4	6	4
Hinges		1	6
Lock		7	0
Labour—Hang and Lock		9	0
4″ x 2″ Door Frame—12 sup. ft. at 163/6	1	0	9
Labour—Making Frame and Fixing		12	0
18ft.—2″ x ¾″ Stop Bead at 4d.		6	0
Fixing Stop Bead		3	6
Cartage		2	6
Nett Cost—1″ Ledge Door	£7	8	6

Example No. 6—Pair of Garage Doors—Oregon.

Door 7′ x 8′ x 1¾ Oregon—5 x 2½ Oregon Frame—Hinges—Pad Bolt, and bolts—Hasp and Staple.

	£	s.	d.
Door—Framed, Ledged—Top for Glazing	16	4	6
3 Pairs 18″ Tee Hinges at 2/–		6	0
1 Hasp and Staple		2	0
2″ Padlock 8/6 ; 2 bolts, 1/6		10	0
Labour—Fitting, Hang and Lock	1	16	0
Door Frame—24 lin. ft. Oregon 5″ x 2½″ at 181/3 ...	2	5	4
Labour—Making Frame and Fixing		15	0
Glass—12 sq. ft.—Figured Rolled White at 1/3 ...		15	0
Labour Glazing 12 sq. ft. at 6½d.		6	6
Cartage		3	0
Nett Cost Garage Doors	£23	3	4

Example No. 7—Ledged and Braced Garage Doors.

7′ x 8′ x 1″ Oregon Doors—No Glazing Required—Fixed to Studs.

	£	s.	d.
1 Pair Oregon Ledged and Braced Doors	12	3	0
3 Pairs Tee Hinges at 2/–		6	0
1 Hasp and Staple		2	0
1 Padlock 8/6 ; 2 Bolts, 1/6		10	0
Labour—Fit, Hang and Lock	1	10	0
Cartage		3	0
Nett Cost—Door Complete	£14	14	0

Door Stops if required add 22ft. at 6d. = 11/–.

If smaller doors required deduct difference in price of doors.

WINDOWS—BOX FRAMES.

Hardwood Sills (N.S.W. Hardwood).

5 x 3—Sunk and Weathered 114/6 per 100ft. super.
6 x 3— ,, ,, 114/6 ,, ,, ,,
7 x 3— ,, ,, 114/6 ,, ,, ,,
8 x 3— ,, ,, 116/9 ,, ,, ,,

Lengths specially ordered and supplied as ordered, 3/6d. per 100ft. super extra.

The following species when specially ordered plus :—

Tallowwood	...	7/– per 100ft. super extra.
Spotted Gum	...	7/– ,, ,, ,, ,,
Red Mahogany	...	7/– ,, ,, ,, ,,
Blue Gum	...	4/9 ,, ,, ,, ,,
Iron Bark	...	9/3 ,, ,, ,, ,,

Species other than above when specially ordered 1/9d. per 100ft. super extra.

Sills.

3 x 2 Oregon sills for cement sheets ... 88/9 per 100ft. lineal.

Box Frame Material.

	Oregon Per 100ft. lineal.
Pulley Styles.	
4 x 1, fin. $3\frac{7}{16}$ x $\frac{3}{4}$in.—No. 84 for $1\frac{1}{2}$in. Sashes	59/6
$4\frac{1}{4}$ x 1 fin. $3\frac{15}{16}$ x $\frac{3}{4}$in.—No. 85 for $1\frac{3}{4}$in. Sashes	74/3
Inside Linings.	
3 x $\frac{3}{4}$, fin. $2\frac{3}{4}$ x $\frac{9}{16}$in.—No. 88	40/3
$1\frac{1}{2}$ x $\frac{3}{4}$, fin. $1\frac{1}{4}$ x $\frac{9}{16}$in.—No. 89 Head only	21/6
4 x $\frac{3}{4}$, fin. $3\cdot\frac{5}{8}$ x $\frac{9}{16}$in.—No. 91 Mullion (lead weights only)	53/6
6 x $\frac{3}{4}$, fin. $5\frac{1}{2}$ x $\frac{9}{16}$in.—No. 93 Mullion (Cast Iron weights)	79/3
Outside Linings.	
$3\frac{1}{2}$ x 1, fin. $3\frac{1}{4}$ x $\frac{3}{4}$in.—No. 86	59/6
2 x 1, fin. $1\frac{3}{4}$ x $\frac{3}{4}$in.—No. 87 Head only	31/9
5 x 1, fin. $4\frac{5}{8}$ x $\frac{3}{4}$in.—No. 90 Mullion (Lead weights only)	74/3
7 x 1, fin. $6\frac{1}{2}$ x $\frac{3}{4}$in.—No. 92 Mullion (Cast Iron weights) ...	103/9

Sash Stock.

			Oregon
2 x $1\frac{1}{2}$	Styles No. 94	Fin. $1\frac{3}{4}$ x $1\frac{3}{32}$ ...	48/–
2 x $1\frac{3}{4}$	,, No. 95	,, $1\frac{3}{4}$ x $1\frac{9}{16}$ ...	65/–
3 x $1\frac{1}{2}$	Bottom Rail No. 96	,, $2\frac{3}{4}$ x $1\frac{5}{16}$ ...	69/9
3 x $1\frac{3}{4}$	,, ,, No. 97	,, $2\frac{3}{4}$ x $1\frac{9}{16}$ ...	93/3
2 x $1\frac{1}{2}$	Meeting Bars Nos. 98 and 99	,, $1\frac{11}{16}$ x $1\frac{5}{16}$ ...	48/–
$2\frac{1}{4}$ x $1\frac{3}{4}$	,, ,, Nos. 100 and 101	,, $1\frac{15}{16}$ x $1\frac{9}{16}$ ...	79/3
$1\frac{1}{2}$ x 1	Bars No. 102	,, $1\frac{5}{16}$ x $\frac{13}{16}$ ...	25/9
$1\frac{3}{4}$ x 1	,, No. 103	,, $1\frac{9}{16}$ x $\frac{13}{16}$ ...	37/–

Box Frames (Clear Oregon)

Manufactured ex Standard Size Material to suit $1\frac{1}{2}$″ Sashes.
In all items first measurement shown is height.

Storm Mould Size	Overall Size	Sash Size	No. of Openings	Each
4′–3″ x 3′–$1\frac{1}{2}$″	4′–$3\frac{1}{2}$″ x 3′–$5\frac{1}{2}$″	4′–0″ x 3′–0″	1 ...	80/–
3′–$8\frac{1}{4}$″ x 3′–$1\frac{1}{2}$″	3′–$8\frac{3}{4}$″ x 3′–$5\frac{1}{2}$″	3′–$5\frac{1}{4}$″ x 3′–0″	1 ...	76/9
3′–$8\frac{1}{4}$″ x 6′–$3\frac{1}{8}$″	3′–$8\frac{3}{4}$″ x 6′–$7\frac{1}{8}$″	3′–$5\frac{1}{4}$″ x 2′–11″	2 ...	142/–
4′–3″ x 3′–$6\frac{1}{2}$″	4′–$3\frac{1}{2}$″ x 3′–$10\frac{1}{2}$″	4′–0″ x 3′–5″	1 ...	82/9
4′–3″ x 6′–$3\frac{1}{8}$″	4′–$3\frac{1}{2}$″ x 6′–$7\frac{1}{8}$″	4′–0″ x 2′–11″	2 ...	147/3

Stud openings sizes $\frac{1}{2}$″ higher and wider than overall dimensions.

Box Frame Sashes (Clear Oregon)

In all items first measurement shown is height.—Unglazed.

Design No.	Size	No of Lights	Per Pair Unglazed
55	3′–$5\frac{1}{4}$″ x 3′–0″ x $1\frac{1}{2}$″	2	32/9
55	3′–$5\frac{1}{4}$″ x 2′–11″ x $1\frac{1}{2}$″	2	31/6
55	4′–0″ x 2′–11″ x $1\frac{1}{2}$″	2	32/6
56	4′–0″ x 2′–11″ x $1\frac{1}{2}$″	4	37/–
55	4′–0″ x 3′–0″ x $1\frac{1}{2}$″	2	33/9
56	4′–0″ x 3′–0″ x $1\frac{1}{2}$″	4	38/9
55	4′–0″ x 3′–5″ x $1\frac{1}{2}$″	2	33/9
56	4′–0″ x 3′–5″ x $1\frac{1}{2}$″	4	38/9

Windows may be grouped into single, double and treble openings and priced accordingly at per square foot. Prices per sq. foot taken from examples.

The safer way is to cost each window as a separate item, as shown in examples. The storm mould size is taken as opening measurement.

Example No. 1—Single Oregon Box Frame and Sashes—Fixed complete.

Glazed 21oz. clear glass—Lead weights.

Storm Mould Size—3′–8¼″ x 3′-1½″—Sash Size 3′–5¼″ x 3′–0″ wide.

	£	s.	d.
1 Oregon Box Frame	3	16	9
Labour—Bedding Frame and Bituminous Dampcourse		8	6
1 Pair Oregon Sashes (Unglazed)	1	11	6
Cords—12ft., 2/–. Weights, 4/–		6	0
Labour—Fitting Sashes—Fixing Cords and Weights ...		12	0
Thumb Lifts, 1/–; Sash Fasteners, 1/6; and Labour, 4/–		6	6
Nosing 3″ x 1½″ Oregon 4ft., 3/–; Ovolo Mld. under, 1/–; Fixing, 4/–		8	0
12ft. 4 x 1 Architrave, 7/3; Fixing and Plugging, Nails, 9/6		16	9
Cartage		2	6
Nett cost without glass	£8	8	6
Glazing 8 sq. ft. 26 oz. Clear Glass at 1/6		12	0
Labour Glazing 8ft. at 7d.		4	8
Cost, 16/4 per sq. foot. Nett Cost with clear glass ...	£9	5	2

Add 1 set Architrave 7/– extra for timber framed construction.

Example No. 2—Double Oregon Box Frame and Sashes.

Glazed 21oz. Clear Glass. Lead Weights.

Storm mould size—3′–8¼″ x 6′–3⅛″. Sash size—3′5½″ x 2′–11″ wide.

	£	s.	d.
1 Double Box Frame—Oregon	7	2	0
Labour—Bedding Frame and Bituminous Dampcourse		9	0
2 Pairs Sashes at 31/6	3	3	0
Cords, 6/–; Weights, 8/6		14	6
Labour—Fitting Sashes, Cords and Weights	1	0	0
Thumb Lifts, 2/–; Catches, 3/–; and Labour Fixing, 7/–		12	0
Nosing 3″ x 1½″—7½ft., 6/9, Ovolo Mld., 2/–		8	9
Labour to Nosing and Mould		9	6
16ft. 4 x 1 Architrave at 59/6		9	8
Fixing and Nails, 6/–		6	0
Plugging Walls 16ft. at 4d.		5	6
Cartage		3	6
Nett cost without glass	£15	3	5
Glass 16 sq. ft. at 1/6	1	4	0
Labour—Glazing, 15ft. at 7d.		8	9
Cost, 14/4 per sq. foot. Nett cost with clear glass ...	£16	16	2

For timber framed construction add 7/– extra.

List Prices—UNIQUE BALANCES—Per Set.

(**Note**—Type " M " Balances priced in half sets).

Type	List Price	Description.
" D "	16/–	PRICE per set of four balances complete for "Double Hung " wood openings up to and including 5′–6″ high sash openings, where the weight of either sash is from one to not exceeding 30 pounds.
" M "	47/6	PRICE per half set of two balances complete for " Double Hung " wood openings up to and including 6′–6″ high sash openings, where the weight of sash is from 30 to not exceeding 60 pounds. Order must specify weight of sash.
"H.D."	On Application	PRICE per set of four balances complete for "Double Hung " wood openings up to and including 6′-6″ high sash openings, where the weight of either sash is from 60 to not exceeding 100 pounds. Order must specify weight of sash. (Available on Import Licence until locally manufactured.)

BALANCE EXTRAS.

To Type " D " list price add 1/9 list per 4″ over 5′–6″ high up to 8′–6″ high sash opening.

To Type " M " list price add 3/– list per 4″ over 6′–6″ high up to 8′–6″ high sash opening per half set.

To Type " H.D." list price add (on application) list per 4″ over 6′–6″ high up to 8′–6″ high sash opening.

Type " D " half sets in paper sleeves 12/4 add 1/– for each 4″ rise over 5′–6″ high.

Sash Openings over 8′–6″ and up to 12′–0″ high : Prices on application.

VERY IMPORTANT.

Do not figure, order or supply " D " balances for sash weighing over **30 pounds** or for sash openings over 8′–6″ high.

Where sash weighs from 30 to 60 pounds, type " **M** " **balances must be used.**

Where sash weighs from 60 to 100 pounds, type " **H.D.** " **balances must be used.**

Note.—When ordering half sets (2 balances) for balancing one sash, state **specifically** whether for **upper or lower** sash.

Where spiral balances are used it will be found sufficiently accurate to add the cost of the balances to the examples already given for box frames.

Casement Frames (Clear Oregon).

In all items first measurement shown is height.
For Brick Buildings 4 x 3 Framing, 6 x 3 Hardwood Sills.

Storm Mould size	Overall Size	Sash Size	No. of Openings.	Each
4′–3″ x 1′–11⅝″	4′–4″ x 2′–1⅝″	3′–11¾″ x 1′–9⅛″	1	63/9
3′–8¼″ x 1′–11⅝″	3′–9¼″ x 2′–1⅛″	3′–5″ x 1′–9⅛″	1	61/6
4′–3″ x 3′–10½″	4′–4″ x 4′–0½″	3′–11¾″ x 1′–9⅛″	2	91/3
4′–3″ x 5′–9⅜″	4′–4″ x 5′–11⅜″	3′–11¾″ x 1′–9⅛″	3	122/–

Casement Frames (Clear Oregon).

For Timber Framed Buildings 4 x 1½ framing, 6 x 3 Hardwood Sills.
In all items first measurement shown is height.

Overall Size	Sash Size	No. of Openings	Each
4′–2½″ x 1′–10⅝″	3′–11¾″ x 1′–9⅛″	1	38/9
3′–7¾″ x 1′–10⅝″	3′–5″ x 1′–9⅛″	1	38/–
4′–2½″ x 3′–9½″	3′–11¾″ x 1′–9⅛″	2	62/9
4′–2½″ x 5′–8⅜″	3′–11¾″ x 1′–9⅛″	3	86/3

Casement Sashes (Clear Oregon).

In all items first measurement shown is height.—Unglazed.

Design No.	Size	No. of Lights	Each Unglazed
57	3′–11¾ x 1′–9⅛″ x 1½″	2	20/3
57	3′–5″ x 1′–9⅛″ x 1½″	2	19/–
58	3′–11¾″ x 1′–9⅛″ x 1½″	3	20/9
58	3′–5″ x 1′–9⅛″ x 1½″	3	19/9

WINDOWS—CASEMENTS—BRICK BUILDINGS

Example No. 1—One Opening—Oregon Casement Frame and Sash.
Storm Mould Size 4′–3″ x 1′–11⅝″—Sash Size 3′–11¾″ x 1′–9⅛″ wide. Overall Size 4′–4″ x 2′–1⅝″.

	£	s.	d.
1 Oregon Frame 4″ x 3 with 6″ x 3 H.W. Sill.	3	3	9
Labour—Bedding with Bituminous Damp Course ...		8	6
1 Oregon Sash (Unglazed)...	1	0	3
Pair 2½″ Butt Hinges, 1/3; Fastener, 2/6; Casement Stay, 2/6.		6	3
Labour—Fit, Hang and Lock Sash		15	0
12ft.—1¼″ x ¾″ Stop Bead, 2/6—Labour, 3/–		5	6
3 x 1½″ Nosing, 2/6; Ovolo Mld, 6d.; Fixing, 4/– ...		7	0
12ft. Architrave, 7/–; Fixing and Plugging, 10/– ...		17	0
Cartage		2	6
Nett Cost (Unglazed)	£7	5	9
6 sq. ft. Glass, 26 oz., Clear at 1/6 = 9/–; Glazing 6ft. at 9d. = 4/6		13	6
Cost 16/10 per sq. foot—Nett cost—Glazed Clear Glass	£7	19	3
Add extra cartage and profit.			

Example No. 2—2 Openings—Oregon Casement Frame and Sashes.

Storm Mld. Size 4′–3″ x 3′–10½″—Sash Sizes 3′–11¾″ x 1′–9⅛″ wide.
Overall Size 4′–4″ x 4′–0½″

	£	s.	d.
1 Oregon frame 4″ x 3″ with 6″ x 3″ H.W. Sill	4	11	3
Labour Bedding with Dampcourse		9	6
2 Oregon Sashes	2	0	6
Hinges, Fasteners and Casement Stays		12	6
Labour—Fit, Hang and Lock Sashes	1	10	0
Stop Bead, 5/– ; Labour, 5/–		10	0
Nosing, 4/6 ; Ovolo, 1/– ; Fixing, 7/6		13	0
14ft. Architrave, 8/– ; Fixing and Plugging, 9/–		17	0
Cartage		2	6
Nett Cost (Unglazed)	£11	6	3
12 sq. ft., Clear Glass at 1/6 = 18/——Glazing, 9/–	1	7	0
Cost 14/8 per sq. ft. Nett Cost—Glazed Clear Glass	£13	13	3

Example No. 3—3 Openings—Oregon Casement Frame and Sashes.

Storm Mould Size 4′–3″ x 5′–9⅜″—Sash Sizes 3′–11¾″ x 1′–9⅛″ wide x 1½″. Overall size 4′–4″ x 5′–11⅜″.

	£	s.	d.
1 Oregon frame 4″ x 3″ with 6 x 3 H.W. Sill	6	2	0
Bedding, etc.		8	0
3 Oregon Sashes	3	0	9
Hinges, Fasteners and Casement Stays		18	9
Labour—Fit, hang and lock sashes	2	5	0
Stop bead, 7/6 ; Labour, 7/–		14	6
Nosing, 6/6 ; Ovolo Mould, 1/6 ; Fixing, 11/6		19	6
Architrave, 17ft., 10/– ; Fixing and Plugging, 11/–	1	1	0
Cartage		2	6
Nett Cost Unglazed	£15	12	0
21 sq. ft., Clear Glass at 1/6 = 31/6 ; Glazing 16/–	2	7	6
Cost 13/9 per sq. foot. Nett Cost Glazed	£17	19	6

CASEMENT WINDOWS—TIMBER BUILDINGS.

Example No. 1—One Opening—Oregon Casement Frame and Sash.

Overall size 4′–2½″ x 1′–10⅝″—Sash Size 3′–11½″ x 1′–9⅛″ x 1½″.

	£	s.	d.
1 Oregon Frame	1	18	9
Labour Bedding and Dampcourse		8	6
1 Oregon Sash	1	0	3
Hinges, Fastener, Casement Stay		6	6
Labour—Fit, hang and lock sash		15	0
12ft. Stop Bead, 2/6 ; Labour 3/–		5	6
Nosing, 2/6 ; Ovolo Mld., 6d.—Fixing, 4/–		7	0
24ft. 4 x 1 Architrave 14/——Fixing, 10/–	1	4	0
Cartage		2	6
Nett Cost Unglazed	£6	8	0
Glazed 26 oz. Clear Glass		13	6
Nett Cost Glazed Clear Glass	£7	1	6

Example No. 2—2 Openings—Oregon Casement Frame and Sash.

Overall size 4′–2½″ x 3′–9½″—Sash size 3′–11¾″ x 1′–9⅛″ x 1½″.	£	s.	d.
1 Oregon Frame	3	2	9
Labour bedding and dampcourse		9	6
2 Oregon Sashes	2	1	6
Hinges, Fasteners, Casement Stays		12	6
Labour—Fit, hang and lock sashes	1	10	0
Stop bead, 5/–; Labour, 5/–		10	0
Nosing, 4/6; Ovolo, 1/–; Fixing, 7/6		13	0
28ft. Architrave, 16/–; Fixing, 18/–	1	14	0
Cartage		2	6
Nett Cost Unglazed	£10	15	9
Glazing 26 oz. Clear Glass	1	7	0
Nett Cost Glazed Clear Glass	£12	2	9

Example No. 3—3 Openings—Oregon Casement Frame and Sash.

Overall size 4′–2½″ x 5′–8⅜″—Sash size 3′–11¾″ x 1′–9⅛″ x 1½″.	£	s.	d.
1 Oregon Frame	4	6	3
Labour bedding and dampcourse		9	6
3 Oregon Sashes	3	2	3
Hinges, Fasteners and Casement Stays		18	9
Labour—Fit, hang and lock sashes	2	5	0
Stop bead, 7/6; Labour, 7/–		14	6
Nosing, 6/6; Ovolo Mld., 1/6; Fixing, 11/6		19	6
Architrave, 34ft., 20/–; Fixing, 22/–	2	2	0
Cartage		2	6
Nett Cost Unglazed	£15	0	3
Glazing 26oz., Clear Glass	2	7	6
Nett Cost Glazed	£17	7	9

LATTICE—Per 100 Lineal Feet.	Oregon	Hardwood
Random Lengths :—		
1in. x ¼in. Sawn	5/3	4/–
1in. x ⅜in. Dressed	9/9	8/6
1¼in. x ¼in. Sawn	6/9	5/–
1¼in. x ⅜in. Dressed	11/9	10/–
1½in. x ¼in. Sawn	8/–	6/–
1½in. x ⅜in. Dressed	13/6	11/–

MOULDINGS—PER 100 LINEAL FEET.

	Nominal size	Oregon Hemlock	Pacific Maple	Rimu
Architraves and Band Moulds	2 x 1	31/9	29/9	23/–
	3 x 1	46/3	42/9	32/9
	4 x 1	59/6	56/6	41/–
Stop Beads	1 x ¾	15/3	15/9	12/9
	1¼ x ¾	18/6	20/–	15/6
	1½ x ¾	21/6	22/–	17/–
	2 x ¾	27/9	28/–	21/6
Parting Beads ...	1 x ½	12/3	12/9	10/3
Chair Rail and Cornice	3 x 1	48/9	45/3	—
	4 x 1	62/9	59/9	—
Cover Strips	2 x ½	20/–	—	—
	2½ x ½	24/6	—	—
	3 x ½	29/–	—	—
	3 x ¾	39/6	—	—
Door Stop Bead	4 x ¾	56/9	55/6	44/3
	5 x ¾	71/–	69/3	55/3
	6 x ¾	83/6	81/3	64/6
Facia Boards	6 x 1	88/3	—	—
	8 x 1	117/6	—	—
Half Round	1 x ½	12/3	12/9	10/3
Jamb Linings	4 x 1½	89/–	85/9	62/6
	4½ x 1½	110/9	106/6	77/3
	6 x 1½	134/6	129/–	94/–
Nosings	2 x 1½	49/3	46/6	36/3
	3 x 1½	74/3	70/–	54/6
	4 x 1½	93/3	90/–	66/9
Ovolos, quarter rounds and Scotias	1in.	17/3	17/–	13/3
	1¼in.	25/6	25/–	19/–
	1½in.	35/9	34/6	25/9
	2in.	60/–	57/6	—
Picture Rails ...	2 x 1	31/9	29/9	23/–
	3 x 1	46/3	42/9	32/9
Stair Scotia	1¼ x ¾	22/6	22/6	—
Skirtings	4 x 1	59/6	56/6	41/–
	6 x 1	88/3	83/6	60/3

SKIRTINGS AND PICTURE RAIL.

In estimating the cost of Skirting and Picture rail, the labour cost of plugging is shown separately. This cost is added in brick buildings and does not apply to timber frame construction.

SKIRTING.

Example No. A.—Labour only fixing 100 ft. run 6″ skirting. Not Scribed to Floors.

Labour Fixing Skirting 8 hours at 6/–	£2 8 0
Cost = 6d. per foot—Scribed to Floors allow	9d. per ft.

Example No. 1—Per 100 ft. run—6″ x 1″ Oregon Skirting — Not scribed to Floor.

	£ s. d.
104 lineal feet 6″ x 1″ Oregon skirting at 88/3	4 11 10
Labour Fixing 100 ft. at 6d. and Nails	2 11 0
Cartage	1 3
Cost = 1/6 per foot run—Nett cost 100 ft. without plugs	£7 4 1
If plugged—100 ft. at 4d. per foot	1 13 6
Cost = 1/10 per foot run—Nett Cost plugged ...	£8 17 7

Example No. 2—Per 100′ run—4 x 1 Oregon Skirting.

	£ s. d.
104 lin. ft. 4 x 1 Oregon Skirting at 59/6	3 1 11
Labour and Nails	2 11 0
Cartage	1 3
Cost = 1/2 per foot—Nett Cost—Not plugged... ...	5 14 2
Add Plugging	1 13 6
Cost = 1/6 per foot—Nett cost—Plugged	£7 7 8

Example No. 3—6″ x 1″ Pacific Maple Skirting—Per 100 ft. run.

	£ s. d.
104 ft. 6″ x 1″ Pacific Maple 83/6	4 7 0
Labour Fixing and Nails	2 10 0
Cartage	1 3
Cost = 1/5 per foot run—Nett Cost—Pacific Maple ...	£6 18 3
Add Plugging	1 13 4
Cost = 1/9 per foot run—Nett Cost—Plugged	£8 11 7

Example No. 4—4″ x 1″ Pacific Maple Skirting—Per 100 ft. run.

	£ s. d.
104 ft. 4″ x 1″ Pacific Maple at 56/6	2 18 6
Labour and Nails	2 10 0
Cartage	1 3
Cost = 1/1½ per foot.—Nett Cost, 4 x 1″ Pacific Maple	5 9 9
Add Plugging	1 13 4
Cost = 1/5½ per foot. Net Cost—Plugged	£7 3 1

PICTURE RAIL—OREGON OR PACIFIC MAPLE.

Labour only fixing 100ft. run 3″ x 1 Picture Rail—6 hours at 6/– = £1 16s. 0d. = 4½d. per foot.

Example No. 1—3″ x 1″ Picture Rail—Per 100 ft. run.

	£	s.	d.
104ft. Oregon Picture Rail at 46/3	2	8	1
Labour and Nails 100 ft. at 4½d.	1	17	6
Cartage		1	3
Cost = 10½d. per foot run.—Nett cost—Not Plugged ...	£4	6	10
Add Plugging	1	13	4
Cost = 1/2½d. per foot—Nett Cost—Plugged	£6	0	2

COST OF SHELVING.

Examples No. 1 and No. 2 show the cost of simple wall to wall fixing in short lengths on 2″ x 1″ cleats.

The cost of ladders and brackets are shown separately and must be added to examples in ladder or bracket fixing. A summary of combined costs is shown for convenience in estimating.

Example No. 1—Per 100 ft. run of Shelving.

12″ x 1″ Parana Pine Shelving fixed to cleats—small lengths.	£	s.	d.
100 ft. lineal D.A.R. Parana Pine at 151/3	7	11	3
2″x1″ Cleats and Nails		8	0
Cartage		1	6
Labour cutting and Fixing 15 hours at 6/–	4	10	0
Cost = 2/6 per foot run. Nett Cost	£12	10	9
For Oregon Shelving allow 2/9 per foot run.			

Example No. 2—Per 100 ft. run of Shelving.

18″ x 1″ Parana Pine Shelving fixed to cleats—small lengths.	£	s.	d.
100 ft. lineal D.A.R. Parana Pine—150 super at 157/3...	11	15	11
2″ x 1″ Cleats and Nails		12	0
Cartage		2	3
Labour cutting and fixing 22 hours at 6/–	6	12	0
Cost = 3/10 per foot run. Net Cost	£19	2	2
For Oregon Shelving allow 4/3 per foot run.			

Ladder Rail for No. 1 Example—For 100 ft. of Shelving.	£	s.	d.
2″ x 2″ D.A.R. Parana Pine 34 super ft. at 149/3 ...	2	9	9
Cartage 1/3, and Nails 2/–		3	3
Labour Making and Fixing—8 hours at 6/–	2	8	0
Cost = 1/1 per ft. run of **Shelving.** Net Cost. ...	£5	1	0

Ladder Rail for No. 2 Example—For 100 ft. of Shelving.	£	s.	d.
2″ x 2″ D.A.R. Parana Pine—50 super ft. at 149/3 ...	3	14	8
Cartage, 1/3 ; Nails, 3/–		4	3
Labour—Making and Fixing 10 hours at 6/–	3	0	0
Cost = 1/5 per foot run of **Shelving.** Net Cost ...	£6	18	11

10″ x 8″ B.J. Metal Brackets on 2″ x 1″ Cleats — For 12″ Shelf—Spaced 4 ft. centres—Per 100 ft. of Shelving.

	£	s.	d.
25 10″ x 8″ Black Japan Brackets and Screws at 1/9 ...	2	3	9
25 Cleats at 2d.		4	2
Labour Plugging and Fixing 25 at 1/-	1	5	0
Cost = 9d. per ft. of Shelving. Net Cost	3	12	11

16″ x 14″ Brackets on Cleats—For 18″ Shelf — Spaced 4 ft. centres—Per 100 ft. of Shelving. ... ...

	£	s.	d.
25 Brackets and Screws at 3/-	3	15	0
25 Cleats at 2d.		4	3
Labour—Plugging and Fixing 25 at 1/3	1	11	3
Cost = 1/1½ per ft. of Shelving. Net Cost	£5	10	6

SUMMARY OF SHELVING COSTS—PER FT. RUN OF SHELF.

		Per foot.
12″ Parana Pine Shelf	Short Lengths—Wall to Wall ...	2/6
,, ,, ,, ,,	Fixed on Ladders 2/6 + 1/1 ...	3/7
,, ,, ,, ,,	Fixed on Brackets 2/6 + 9d. ...	3/3
12″ Oregon ,, ,,	Wall to wall in Cupboards	2/9
,, ,, ,, ,,	Ladder Fixing 2/9 + 1/1	3/10
,, ,, ,, ,,	Bracket Fixing 2/9 + 9d.	3/6
18″ Parana ,, ,,	Wall to wall—Short Lengths ...	3/10
,, ,, ,, ,,	Ladder Fixing 3/10 + 1/5	5/3
,, ,, ,, ,,	Bracket Fixing 3/10 + 1/1½ ...	4/11½
18″ Oregon ,, ,,	Wall to wall	4/3
,, ,, ,, ,,	On Ladders 4/3 + 1/5	5/8
,, ,, ,, ,,	On Brackets 4/3 + 1/1½	5/4½

STAIRCASES AND HANDRAILS—DEFINITIONS.

By Courtesy of A. W. Tod & Co.

Strings: The Members supporting the ends of treads and to which they are housed. Wedged are known as **Close Strings.** Adjacent to walls are called **Wall Strings.** Opposite to Wall strings are **Outer Strings.**

Cut or Open Strings: are cut away to profile of treads and risers.

Eased Strings: have a plane curve in elevation where rake or line alters, e.g., at landings and/or winders.

Winders are treads tapering in plan and radiating from central point.

Fliers are treads rectangular in plan.

Winder Strings enclose winders and are usually adjacent to walls.

Wreathed Strings are curved in plan, and are used where string is continuous around changes of direction—they are generally laminated in construction.

Spiral Strings are a continuous curve in plan and are also termed **Wreathed Strings.** They enclose only winders.

STAIRCASES—(Contd.)

Handrailing.

Easings or Easements have a plane curve in elevation where change in rake or line occurs.

Knees have reverse curve to above.

Bends generally applied to level railing with a change in direction in plan, usually 90°.

Escalator Bend used as a terminal at start of rail.

Flat Scrolls or Eased Scrolls used as simple terminal and ease from level to rake, shaped in plan.

Wreathed Scrolls or Curtail Scrolls—more elaborate terminals spiralling from central point.

Wreath to Level is a change of direction in plan of 90° and in elevation from rake to level.

Half Space Landing Wreath is a change of direction in plan of 180° and in elevation from rake to level and back to rake, occurring, naturally, at half space landings.

Quarter Space Wreath is a change of direction in plan of 90° in elevation continuous from one rake to another.

Quarter Space Wreath (where winders occur) the rake steepens suddenly involving extra easings and knees.

Spiral Wreathed Rail has a continuous curve in plan whilst rising or falling on rake, used on Spiral Stairs.

Sweeps are large radius curves on plan and level in elevation.

Costing Staircases.

In estimating the cost of Staircases a base price is given for staircase only, with close strings. This base price does not include balustrade, newels, etc.

To this base price must be added the other fixings according to type of staircase.

The base price is given for various widths of stairs.

		£	s.	d.
Price per Tread for Staircase only. Base price. (not including any balustrade, etc., Close Strings).	30″ Wide	2	14	0
	36″ Wide	2	16	0
	42″ Wide	2	18	6
	48″ Wide	3	6	6

Cut Strings, extra, 17/6 per tread.
Eased Strings, end, extra, 18/9 each.
Winders, extra, up to two, 75/– each, more than two, 62/6 each.
Winder Strings, extra, 37/6 to 62/6 each.
Bullnose treads and rounded ends, etc., from 62/6 to 75/– each.
Plus curtail treads according to size.
Newel posts 4″ x 4″ Allow 6/6 per foot.
,, ,, 5″ x 5″ ,, 8/6 ,, ,,
,, ,, 6″ x 6″ ,, 10/– ,, ,,
Plus as follows for Mortise and Tenon to posts and Stringers, 36/– each.
Plus as follows for Caps and Pendants from 9/– upwards.
Plus as follows for Risers and Nosings scribed to Newels, 10/– each.
Handrail, Straight, moulded 3″ x 2″, 5/– per foot.
,, ,, ,, 3″ x 3″, 6/– ,, ,,
,, ,, ,, 4″ x 4″, 7/10 ,, ,,

STAIRCASES (Contd.).

Wreaths and Bends (see Handrail Continuous).
Wreathed, laminated and built up strings from £10 upwards, according to size, radius, etc.
Balusters—Plain square, 1¼", unfixed, 2/6 each, extra for turning, 1/4 up.
Landings, Fascias and Nosings, 12" x 1", 4/6 per foot.
Bedmoulds 1½" x 1½"—6d. per foot unfixed.

Handrailing (Continuous).

Important.—Fixed on wrought ironwork **previously** bent to wreaths and bends.
Note.—Woodwork must be made first to correct line and twist, any attempt to reverse this procedure will not produce the best result. Due to wide variation between conditions on various buildings, the following prices must serve only as an approximate guide.
Easings and knees and bends from 22/6 upwards.
Escalator Bends from 62/6 upwards.
Flat Scrolls from 62/6 upwards.
Wreathed Scrolls from 87/6 upwards.
Wreaths to level (90° turn on plan), 62/6.
Half space landing wreaths, 125/–
Quarter space landing wreaths, 75/–.
Allow extra where winders and/or close risers occur.
Spiral wreathed rail, 31/– per foot.
Level sweeps (large radius), 12/6 per foot.
Handrail bolts and joints thereby, 12/– each.
Prices will vary considerably depending on size, radius, pitch, section, timber and location.
Circular Spiral Staircases — 18 treads — 10ft. rise—Prices range from £200.
Quotes and Advice on application to :—

A. W. Tod & Co.,
5 Talbot Street,
St. Peters. Phone LA2068.

SHOP FRONTS.

Shop fronts vary in quality and design and it is advisable to obtain quotes from firms engaged in this work. An approximate price may be obtained by costing separately from the specification each item of work viz. : Tiles, Terrazzo, Brick stalls, Piers, Glazing, Ventilation, Entrance Doors, Floors, Ceilings, etc. in the usual way. Owing to the slowness of the different operations and other factors in this work 50 per cent. should be added to costs as a safe margin.

Prices for various work shown under their respective Headings.

The following sample of the usual specifications for shop fronts is given for the use of architects.

SHOP FRONT SPECIFICATIONS.

Entrance Floor :

Prepare for and lay concrete entrance floor and pave with Ceramic tiles or polished Terrazzo.

SHOPFRONTS (Contd.).

Stalls :

Build 4 ½″ brick stalls and face with glazed tiles, carrara or porcelain enamel sheets.

Piers :

Prepare for and face piers with glazed tiles, carrara or porcelain enamel sheets, to match stalls.

Metal Mouldings :

Framing to windows of stainless steel mouldings securely fixed to brickwork and door frame.

Glazing :

Metal mouldings glazed with ¼″ thick clear Plate glass.

Top Hamper :

Above windows glazed with signwritten ¼″ Plate glass or figured rolled glass.

Ventilation :

¼″ Ribbon wire mesh fixed in Panels over top Hamper.

Entrance Doors and Frame :

Constructed of Pacific or Queensland Maple, Panel in doors glazed with ¼″ thick Plate glass.

Window Floors :

Formed with Oregon or Cypress pine joists covered with ⅞″ thick Pine T. & G. Flooring.

Window Ceilings :

Formed with Oregon or Cypress pine joists lined on underside with Masonite, Caneite or fibrous plaster. Top of joists lined with ½″ T. & G. Pine Flooring.

Window Enclosures :

A. Formed with Pacific or Queensland Maple framing, panelled with polished plywood, figured rolled glass or ¼″ thick silvered Plate glass.

B. Formed of Pine framing covered with flush polished plywood, masonite or caneite.

Wall Covering :

Cover wall ends in windows to match enclosures.

For advice and quotes See Advertisement Page 80.

Angles, Degrees and tenths for opening of a Two-foot Rule, in inches and quarters.

Ins.	Degrees	Ins.	Degrees	Ins.	Degrees	Ins.	Degrees	Ins.	Degrees
½	2·4	4¼	20·4	8	39·0	11¾	58·6	15½	80·4
¾	3·6	½	21·6	¼	40·2	12	60·0	¾	82·0
1	4·8	¾	22·8	½	41·5	¼	61·4	16	83·6
¼	6·0	5	24·0	¾	42·8	½	62·8	¼	85·2
½	7·2	¼	25·3	9	44·0	¾	64·2	½	86·9
¾	8·4	½	26·5	¼	45·3	13	65·6	¾	88·5
2	9·6	¾	27·7	½	46·6	¼	67·0	17	90·2
¼	10·8	6	29·0	¾	47·9	½	68·5	¼	91·9
½	12·0	¼	30·2	10	49·2	¾	69·9	½	93·6
¾	13·2	½	31·4	¼	50·6	14	71·4	¾	95·4
3	14·4	¾	32·7	½	51·9	¼	72·9	18	97·2
¼	15·6	7	33·9	¾	53·2	½	74·3	¼	99·0
½	16·8	¼	35·2	11	54·6	¾	75·8	½	100·8
¾	18·0	½	36·4	¼	55·9	15	77·4	¾	102·7
4	19·2	¾	37·7	½	57·3	¼	78·9	19	104·7

GLUED LAMINATED TIMBER CONSTRUCTIONS

By Malcolm S. Stanley, A.M.I.E. (Aust.)

Glued laminated timber construction has been carried out sucessfully since the beginning of the century. The timber used was of various coniferous species and the structural results are excellent. The extensive use of this construction was delayed until the development of water-resistant and waterproof glues, which reached a high stage of development during the last decade.

During and since the last War, failure of steel supplies in Australia concentrated the attention of Australian engineers to the alternate use of glued timber sandwich construction. Ground to ground arch ribs were pioneered by Ralph Symonds and flat arch construction, pier to pier type, was designed and used by the writer.

Latest inspection of all such glued laminated timber constructions, some over ten years old, shows no deterioration, it being a recognised fact that in many cases, weight for weight, wood is stronger than steel, with the added advantage of being much stiffer. The inherent faults of sawn timber used in the ordinary manner have prevented the engineer from using it as a designing medium, owing to its uncertainty of strength and hidden defects in what is apparently a sound piece of solid timber.

Laminating of timber.—The advantages of laminating of timber do not so much lie in its increased strength but in its uniform reliability of strength. The engineer, with a properly designed laminated beam or stanchion, has now at his disposal a medium in which the strength factor and reliability can be calculated to fine limits, of approximately plus or minus ten per cent of its actual breaking strain.

The principle is that a timber is re-engineered by cutting the timber into thin layers, reversing the grain and glueing,

The design practice of the Australian originator of the laminated arch and beam is, where possible, to use not less than 30 laminations in a beam of arch of a span of, say 100 feet with a section of 24 inches in depth. When carefully machined and glued the section of such members would show that, there being thirty laminations, any loss of strength in one lamination would, by the law of averages, very seldom coincide with a defect in its adjoining lamination.

The development of water-resistant glues has given an impetus to the use of laminated timbers for building work, but this development, generally speaking, makes use of such glues dependent upon quick pressing after application of the glue, or what is known as a short "pot-life," an average of sixty minutes. In many cases the more water-resistant the glue the shorter the "pot-life," so that the aim in America, on the Continent and in England is that immediately the glue is applied the timber shall be got under pressure within a short space of time.

Cramping has been carried out by the orthodox method, requiring 4 or 5 operations in the manufacture of an arch span of, say, 100 feet and a time lag of several days, owing to the necessity of the cramping operations being made progressive before the glue starts to set, prior to pressing.

During the War Ralph Symonds developed a most ingenious method of overcoming such disadvantage and at the present time we see, by the use of his patent, such size arch made in one operation only, in forty-five minutes.

By the utilisation of air pressure and thousands of metal fingers which hold the timber in a predetermined position, these at a moment's notice, disappear and air pressure as may be specified is applied.

The principal disadvantage of solid sawn timber is that the different species have different strengths; knots, seen or unseen, through inadvertence may be placed in the tension zone so that the chord automatically fractures at such spot. Splits or fractures not discernible to the eye, or the variation of grain, may cause a fault to appear under load. Proper lamination of timber overcomes this defect and many others.

Prior to glueing, timbers must be carefully dressed to a uniform thickness. Ralph Symonds specifies a tolerance of $\frac{12}{1000}$ in. after machining and that all lengths of timber shall not show the slightest taper at its extremities before glueing.

Curvatures.—Sharp bends should be avoided and the radius should never be less than 80 times the thickness of the laminae, and in accordance with the following table :—

Thickness of Timber	Minimum Radius
1″	80″
$\frac{7}{8}$″	70″
$\frac{3}{4}$″	60″
$\frac{5}{8}$″	50″
$\frac{1}{2}$″	40″
$\frac{3}{8}$″	30″
$\frac{1}{4}$″	20″
$\frac{1}{8}$″	10″

Symonds, in addition to this, states that the number of laminations in a beam or arch, should not be less than 24 pieces, to permit the engineer to calculate loading figures.

Tests show that when various species of solid timber are treated as a beam, the variation in species shows enormous variations in load value, but when laminated into deep section the variation of species shows very little different results in the strength of each specie.

The ideal design of a beam or arch is that the lower chord, representing about one-third of the section, shall be of comparatively straight grain timbers of high tensile strength. The centre covering the neutral line may be of timber of comparatively little strength value. The top portion may be of timber of knots and wiry grain and preferably resistant to end grain crush.

All timbers used can and should be preservatized by modern wood preservatives against fungus, and insect attack.

The costs compared to steel truss construction is approximately 60 per cent and in larger spans 50 per cent.

For advice and prices on this class of construction, see advertisement, page 50.

PLYWOODS

INDUSTRIAL PLYWOODS. NOT WATERPROOF.

Kauri and Hoop Pine—Prices for 6 ft. x 3 ft. Sheets per 100 Square Feet.

US Unsanded : S1S Sanded one side : S2S Sanded two sides.

HOOP PINE.

Thickness	No. of Ply	First Class			Second Class	
		US	S1S	S2S	US	S1S
3/16 in.	3	45/–	45/6	51/6	44/3	44/6
1/4 in.	3	56/6	57/–	63/–	55/6	56/3
5/16 in.	3	68/–	68/6	74/6	66/9	67/6
5/16 in.	5	78/3	78/9	84/9	77/–	77/6
3/8 in.	3	79/9	80/3	86/3	78/6	79/–
3/8 in.	5	90/–	90/6	96/6	88/9	89/3
7/16 in.	5	101/6	102/3	108/3	100/6	101/–
1/2 in.	5	113/–	113/9	119/9	111/3	112/–
5/8 in.	5	136/–	137/–	143/–	133/9	134/9
3/4 in.	7	169/6	170/9	176/9	167/3	168/6
13/16 in.	7	181/3	182/6	188/6	178/6	179/9
7/8 in.	7	193/–	194/3	200/3	190/–	191/3

QUEENSLAND KAURI PINE.

In 6 ft. x 3 ft. Sheets.

3/16 in.	3	38/–	38/3	44/3	37/–	37/6
1/4 in.	3	47/–	47/9	53/9	46/3	46/9
5/16 in.	3	56/–	56/9	62/9	55/–	55/6
5/16 in.	5	66/3	67/–	72/3	65/–	65/9
3/8 in.	3	65/6	66/–	72/–	64/3	65/–
3/8 in.	5	75/9	76/3	82/3	74/6	75/–
7/16 in.	5	85/–	85/9	91/9	84/–	84/6
1/2 in.	5	94/–	94/9	100/9	92/3	93/–
5/8 in.	5	112/6	113/9	119/9	110/6	110/9
3/4 in.	7	141/3	142/6	148/6	138/9	140/–
13/16 in.	7	150/3	151/6	157/6	147/6	148/9
7/8 in.	7	159/3	160/6	166/9	156/3	157/6

For Large Sheets : For each 1/16 in. in thickness add the following prices to above prices.

	First Class.	Second Class.
6 × 4, 7 × 2, 7 × 3	1/3 per 100 sq. ft.	6d. per 100 sq. ft.
7 × 4, 8 × 3	2/6 ,, ,, ,, ,,	1/– ,, ,, ,, ,,
8 × 4	3/– ,, ,, ,, ,,	1/6 ,, ,, ,, ,,

SLICED FANCY—PER 100 SQUARE FEET.

5 x 3, 6 x 3 and 7 x 3 Sheets.

	3/16 in.	1/4 in.	5/16 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	13/16 in.
No. 1 Walnut sanded one side	122/6	139/6	175/6	193/6	240/6	277/–	312/–	333/9
No. 2 ,, ,,	109/3	126/6	162/3	180/6	227/6	263/9	299/–	320/6
No. 3 ,, ,,	102/9	119/–	155/6	173/6	220/9	257/–	292/3	314/–
No. 4 ,, ,,	98/9	116/–	151/9	169/9	217/–	253/3	288/6	310/–
No. 5 ,, ,,	94/–	111/–	197/–	165/–	212/–	248/6	283/6	305/3
No. 1 Maple ,,	122/6	139/6	175/6	193/6	210/6	277/–	312/–	333/9
No. 2 ,, ,,	109/3	126/6	162/3	180/3	227/6	263/9	299/–	320/6
No. 3 ,, ,,	98/9	116/–	151/9	169/9	217/–	253/3	288/6	310/–
No. 1 Silky Oak ,,	113/9	131/–	166/9	184/9	232/–	268/3	303/6	325/–
No. 2 ,, ,,	101/6	118/6	154/6	172/6	219/6	256/–	291/–	312/9
No. 1 Silver Ash ,,	122/6	139/6	175/6	193/6	240/6	277/–	312/–	333/9
No. 2 ,, ,,	109/3	126/6	162/3	180/3	227/6	263/9	299/–	320/6

BOBBIN PLY AND PRINTERS BLOCKS—PER 100 SQUARE FEET.

Unsanded ex Brisbane.

Thickness	Price
1/2 in.	105/–
9/16 in.	113/6
5/8 in.	123/–
11/16 in.	131/–
3/4 in.	139/–
13/16 in.	147/9
7/8 in.	156/9
15/16 in.	165/–
1 in.	173/9
1 1/2 in.	201/–

CORESTOCK.

Description	Maximum Price Per Sq. Foot
Crossbanded Corestock	2/5
Solid Corestock Crossbanded	2/5
Solid Core :	
No. 1 Walnut	3/6
No. 2 ,, ...	3/4
No. 3 ,, ...	3/3
No. 1 Maple and Silver Ash	3/5
No. 2 ,, ,, ,, ...	3/3
No. 3 ,, ,, ,, ...	3/2
No. 1 Silky Oak	3/4
No. 2 ,, ...	3/2

ROTARY FANCY PLYWOOD—PER 100 SQ. FEET.

In 6 ft. x 3 ft. sheets. First Class sanded one side.

Thickness	Ply	Tulip Oak	Silver Ash	Maple	Walnut
3/16 in.	3	48/–	49/–	51/9	53/–
1/4 in.	3	60/3	64/3	65/6	68/9
1/4 in.	5	71/–	73/–	76/6	80/3
5/16 in.	3	72/3	74/–	78/6	82/6
5/16 in.	5	82/6	84/3	88/9	92/9
3/8 in.	3	85/–	87/–	92/6	97/3
3/8 in.	5	95/3	97/3	102/9	107/6
7/16 in.	5	108/–	109/9	116/–	121/9
1/2 in.	5	119/3	122/3	129/6	135/9
5/8 in.	5	141/–	147/9	156/9	164/6
1/4 in.	7	178/9	183/3	194/–	203/3
13/16 in.	7	190/9	195/6	207/3	217/9
S2S add for 100 sq. ft.		8/–	8/–	10/9	13/6
B Grade deduct		2/6	2/6	2/6	2/6

For sheets 5 ft. × 3 ft. and 7 ft. × 3 ft. add 8d. per 100 sq. ft. for every 1/16 in. For centre matching add 9/4 per 100 sq. ft. For finished thickness add 4/1 per 100 sq. ft.

PACIFIC MAPLE (BORNEO CEDAR)—PER 100 SQ. FEET.

A Grade 6 ft. x 3 ft. Sheets.

Thickness	Ply	Price
3/16 in.	3	62/3
1/4 in.	3	79/6
1/4 in.	5	91/6
5/16 in.	3	96/6
5/16 in.	5	106/6
3/8 in.	3	114/–
3/8 in.	5	123/9
7/16 in.	5	140/6
1/2 in.	5	158/–
5/8 in.	5	192/3
3/4 in.	7	236/9
13/16 in.	7	254/–
7/8 in.	7	270/9

B Grade deduct 2/6 per 100 sq. ft.
For 7 ft. × 3 ft. add 1/– per 100 sq. ft. for each 1/16 in.

FANCY PLYWOODS AND WATERPROOF PLYWOODS.

The art of veneering by the gluing of thin pieces of timber upon other pieces, with the grain running in the opposite direction, dates back to the ancient Egyptians.

About the 1920's a remarkable advancement was made in the development of glues of a reliability which permitted a wide range of materials to be bonded with extreme strength and permanency.

Glues :

The present-day plywood, veneered panels and laminated timbers are bonded by glues of many different formulas which may be grouped under four headings—Animal, Vegetable, Urea and Synthetic resins. The two last-mentioned groups, developed since 1920, have revolutionised the industry.

All, however, are used for purposes for which manufacturing processes and conditions make them most suitable, but the synthetic waterproof glues have opened up new fields, permitting the architect and engineer to obtain materials of strength, beauty and reliability.

Animal and Vegetable glues, being hydroscopic and organic, although strong, are not always reliable in resisting damp or fungi.

The Ureas and similar groups have good resistance and are classed as water resistant.

Synthetic resin groups, as typified by the phenolic resins, being inorganic, resist any deterioration by water and fungi and are the ideal, from the plywood user's point of view, of quality and permanence.

From the plywood manufacturer's viewpoint, expensive plant is required, and careful methods are necessary in the use of this glue and material when processing into the finished panel. The most accepted form of using synthetic resins, is when a thin sheet of fine tissue paper is impregnated with solution of synthetic resin. This glued sheet is placed between layers of timber and after applying heat up to 320 fahrenheit and pressures ranging from 100 pounds to 800 pounds per square inch on the panel, the glue polarises by the heat and softens in conjunction with the extreme pressure.

The glue itself is of an average thickness of only one-thousandth of an inch, and the use of the tissue paper impregnated with it, is for the purpose of giving a most accurate spreading of the glue. The thinness of glues makes it imperative that all veneers be most accurate in cut and thickness gauged in certain cases to a tolerance of one-thousandths of an inch, and the veneers cut extremely smooth.

The two main problems mentioned above do not come up in the use of most other glues, as, being liquid glues, they cushion or fill inaccuracies in the veneers.

Waterproof plywood panels in the British Empire have been limited by the size of the hot plates in the press, to a maximum of 8 feet by 4 feet, and when it is necessary to make larger panels, such size sheets have been joined after they come out of the press, by scarfing and gluing again. This method has certain technical disadvantages, giving unreliable joins as compared with the remainder of the panel.

In order to overcome this disadvantage, Mr. Ralph Symonds, at the outbreak of war, patented, designed and built several Hot Presses, one of which had plates approximately 25 feet by 7 feet, permitting the sheet to be removed from the Press in one piece.

Veneers :

Plywood is manufactured from plies or layers of veneers glued or pressed. The two main types of veneers used for construction of plywood are :—

Rotary Veneer.—This is produced by placing a cylindrical log on a rotary lathe or " peeler," and the log is spun against a knife or cutting blade. This has the effect of stripping or peeling a continuous sheet with much the same effect as unrolling a sheet of linoleum. The veneer thus peeled is called " rotary cut " veneer.

Rotary Veneer is used in two main ways :—

(1) For foundation work for centres of panels ; and
(2) For finishing work for faces of panels.

Thicknesses are pre-determined on the machine and vary from $\frac{1}{100}$ in. up to $\frac{3}{16}$ in.

The selection and use of the different thicknesses and species of timber form a fundamental basis of good plywood manufacture.

It may often be noticed with rotary plywood, that when an endeavour is made to polish or lacquer, and in some cases, even paint, that minute cracks often appear, running the length of the grain. This is a characteristic of rotary cut veneer, but these minute cracks have very little effect upon the strength of the panel under average conditions. However, under damp conditions or where plywood is to be used in boat building, it is possible, through wrong selection of timbers and/or careless manufacture and handling, to set up condtions where fungus may enter these cracks and cause the timber to rot.

For boat building work and high grade exterior work, use face veneers no thicker than $\frac{1}{16}$ in. in timbers selected to give the minimum crazing, and in some cases even thinner than $\frac{1}{16}$ in.

Sliced Veneer.—This veneer is produced by cutting a selected log, stump or crotch (fork) of a tree in a special manner, into a flitch or sawn piece of timber. This flitch is cut on a " slicer," which is in effect, a giant carpenter's plane made of steel with a blade up to 12 feet wide.

The sliced veneer is used for ornamental purposes and the vast majority of " fancy " plywood and decorative panels, figured planks, butts and burls and crotches are produced from sliced veneers.

It is also used as a groundwork (superior to rotary veneer) on which to lay very delicate face veneers. In this instance the sliced veneer is used in much the same manner as a rotary veneer, but it is superior as it does not show minute hair cracks to the extent to which the rotary veneer does.

Sliced veneers for fancy or ornamental uses are cut to bring out the best of the natural figuring of the tree. The figure is enhanced by matching or turning over and joining consecutive leaves of veneer (in thicknesses between 1/20 in.—1/60 in.) in the same way as book leaves are opened out.

In cutting highly figured veneers, poor figure or low quality sliced veneers are discarded. It is of prime importance to use only the first quality figure and grades of sliced veneers.

The progressive manufacturer produces a fancy plywood or a fancy panel which is virtually TROUBLE FREE.

It is fully possible to produce in quantity beautiful figured panels and plywoods immune from many troubles hitherto thought to be a necessary evil in the manufacture of plywoods and panels. Ralph Symonds Limited, of Sydney, supplies a printed guarantee label which covers all faults, as follows :—

RESWOOD GUARANTEE.

Cracking or crazing of the figured face veneer,
Twisting or warping after manufacture,
Sunken joints or hollows in the core,
Blisters on the face veneers,
Loose veneers and other glueing faults, and
Lyctus Borer Attack.

These correctly manufactured fancy panels or ply sheets withstand a test of three hours in boiling water without damage to the sheet.

It is not necessary for a highly figured panel to withstand this boiling water test, but a panel which will withstand this and various other tests, is a panel which can be guaranteed over an indefinite period under any climatic conditions.

The average prices are as follows :—

First Quality Rotary Waterproof Plywood	$\frac{3}{16}$ in.	1/3 per sq. ft.
Highly Figured Waterproof Plywood Panels	$\frac{1}{4}$ in.	2/5 to 3/- per sq. ft.
Highly Figured Waterproof Joinery Panels	$\frac{7}{8}$ in.	6/9 and upwards per sq. ft.

Sizes available—Up to 7 feet by 25 feet (thickness from $\frac{1}{8}$ in. to $1\frac{1}{8}$ in.).

Prices vary according to the combination and specifications required.

For supplies and quotes see advertisement, page 50.

SPECIAL FORMS OF WATERPROOF AND FANCY PLYWOODS.

Plastic Surfaced Waterproof Plywood.

This product, known as PLASPLY, is a precision-made plywood with the best features outlined in the foregoing chapters and which, in addition, is plasticised on its outer faces. Its characteristics are :—

Ready polished on both face surfaces, thereby eliminating polishing and lacquering costs.

Smooth and even surfaces with none of the hollows, waves and bumps so often seen on polished solid core and laminated core panels.

Warp and twist free after manufacture, even under extreme and varying climatic conditions.

Hard surfaced—very much harder than polishes and standard lacquers.

Waterproof—all glue lines fully waterproofed.

Salt-waterproof—surfaces.

Heat resistant—boiling liquids have no effect, and therefore, a hot teapot may be allowed to stand on PLASPLY without any effect.

It is fire-resistant though not fireproof.

Acid resistant—most acids and spirits have no effect, and strong acids have only a limited effect.

Permanent—the use of thermo setting plastics gives a permanency and stability of product unobtainable by other means.

Easily worked—the same as ordinary plywood. Does not damage tools.

A complete product—no glueing, fixing, etc., to a support backing required.

Sizes available—6 ft. x 3 ft., 7 ft. x 3 ft. and 72 in. x 24 in., and 72 in. x 21 in., depending on the finish required.

The average price for PLASPLY plastic surfaced panels is 5/10d. per square foot for $\frac{3}{4}$ in.

The prices vary according to the combinations and specifications required.

Uses.—There are numerous uses for this product, such as Table Tops, Built-in Fittings, Cupboard Doors, Shop Fittings, Kitchen and Laundry Fittings, Industrial and Laboratory Table Tops, Coachwork and Boatbuilding, Electrical Switchboard Faces and other Electrical work where low conductivity is desirable.

Also, in all structural work where accuracy and stability are required and where variations of $\frac{1}{64}$ in. are either desirable or specified.

For supplies and quotes see advertisement, page 50.

Concrete Forms.

There is another form of PLASPLY which has been developed for use in **concrete form work** and these sheets for concrete form work can be supplied in giant sized boards, 24 ft. x 7 ft. x $\frac{5}{16}$ in. (or thicker if required), plasticised on two sides.

Provided a coat of oil is given before use, these sheets may be used repeatedly and on both sides. With reasonable care, they should therefore prove to be very inexpensive, especially in view of the small amount of carpentry work required to support these giant sheets, resulting in saving of skilled labour costs.

The price of the $\frac{5}{16}$ in. is :—

25 ft. x 7 ft. Approx. £31 8 0 per sheet.

For supplies and quotes see advertisement, page 50.

Aluminium Armoured Plywood and Stainless Steel Armoured Plywood.

These improved forms of modern waterproof plywood, now so popular for railway, motor coach, shipbuilding and hospital construction and modern fireproof building construction in England and the United States, are also available in Australia, being of Australian manufacture.

Aluminium armoured plywood and stainless steel armoured plywood give the builder, shipbuilder or other user the advantages of a product which is stable, of fine appearance, of hard surface, easy to clean and fully fireproof.

Sizes up to 25 ft. x 7 ft. up to 2 in. thick.

Aluminium armoured RESWOOD (waterproof plywood). Prices on application.

Fireproofed Waterproof Plywood.

Properly **fireproofed** waterproof plywood can be manufactured so that a sheet as thin as $\frac{3}{16}$ in. can be made to stand before a blow torch with the sole effect on the plywood of blowing a circular hole clear through the plywood and charring around the hole, but with the removal of the blow torch, all sign of combustion in the plywood will cease.

This fire retardant plywood not only **resists** fire, but helps to smother or **retard** it.

The price for $\frac{3}{16}$ in. is approximately 1/9d. per square foot, and other prices may be had on request.

See Manufacturers' advertisement, page 50.

CANVAS GOODS

ABERDEEN CANVAS AND COTTON DUCK TARPAULINS.

These tarpaulins are made from sturdy time-defying cloths, plain or waterproof, to withstand the most rough usage and to defy the elements and are made in sizes 6′ x 8′ to size 28′ x 32′, or larger if required. All eyelets are reinforced. The cloths are the finest procurable.

They are manufactured in various weights of cloth to suit all purposes. The prices given serve as a guide but it is advisable to consult the manufacturers on your coverage problem; they will be pleased to quote and advise on the most suitable tarpaulin for any particular job. (See Advertisement Page 47).

SPECIAL WATER-PROOFED DUCKS—KHAKI OR GREEN.

Made to any size required.

Approximate Prices—Various Sizes.

Nos.	6	7	8	9	No. 10
Sizes in Feet	Light W'proof 16G Green 16K Khaki	Medium W'proof 18G Green 18K Khaki	Heavy W'proof 22G Green 22K Khaki	Extra Hvy. W'proof 28G Green 28K Khaki	O.M. Green Birkmyre
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
6 x 8 ...	4 7 5	4 18 3	5 11 7	6 3 9	5 11 4
8 x 10 ...	6 16 8	7 14 9	8 16 8	9 16 7	8 16 4
10 x 12 ...	9 12 0	10 18 3	12 10 3	13 19 4	12 9 9
12 x 14 ...	13 5 11	15 2 9	17 7 9	19 8 9	17 7 3
12 x 18 ...	16 13 8	19 0 1	21 17 4	24 9 1	21 16 4
14 x 16 ...	17 13 4	20 2 1	23 1 11	25 16 5	23 1 0
16 x 18 ...	22 4 0	25 6 4	29 2 4	32 11 8	29 1 3
16 x 20 ...	24 13 8	28 2 8	32 7 1	36 3 9	32 5 9
18 x 20 ...	27 16 1	31 13 7	36 8 5	40 15 1	36 7 1
18 x 24 ...	32 12 4	37 4 11	42 18 9	48 2 4	42 17 1
18 x 26 ...	35 4 9	40 5 1	46 8 5	52 0 3	46 6 5
20 x 24 ...	36 9 9	41 13 8	48 1 1	53 16 8	47 19 1
22 x 26 ...	42 17 9	49 0 4	56 10 7	63 7 0	56 8 1
24 x 28 ...	50 9 0	57 13 5	66 10 7	74 11 5	66 7 11
26 x 28 ...	54 10 0	62 5 7	71 16 3	80 9 3	71 13 5
28 x 30 ...	63 2 3	72 4 0	83 7 0	93 9 4	83 3 5

Aberdeen Tarpaulins may be hired from 2/– per day.

"SOLVOLENE" PROOFING COMPOUND.

The ideal water-proofing compound for all canvas goods—khaki and green. Easily applied and most effective. Is also mildew-resistant. ½ gallon bottle—19s. 1d.; 1 gallon tin—£1 8s. 7d.; 2½ gallon tin—£3 7s. 7d.

"ABERDEEN" OUTSIDE VERANDAH BLINDS—DROP TYPE.

Made to required sizes.

Approx. Prices—Popular Sizes.

Size		10 oz. duck	12 oz. duck	15 oz. duck	18 oz. duck or green waterproof, rot-proof duck or red, green and brown 3″ block striped duck	Plastic stripe multi-coloured fadeless rot-proof water proof duck
Width Feet	Drop Feet					
5	5	85/5	91/11	99/7	108/11	121/7
5	7	97/–	105/7	115/9	128/5	147/4
5	9	108/9	119/5	132/–	147/9	168/11
6	5	88/4	95/4	103/7	113/11	125/10
6	8	107/4	117/9	130/1	145/4	163/7
6	10	116/–	128/–	142/3	159/11	179/7
7	5	95/11	103/11	113/7	125/3	141/1
7	8	116/4	128/–	142/–	159/4	181/4
7	10	133/8	148/7	166/4	188/3	213/7
8	5	112/–	121/5	132/11	147/1	169/1
8	8	138/–	152/3	169/7	190/8	220/9
8	10	152/7	169/5	190/3	214/9	252/11
9	5	119/3	129/7	142/–	157/3	175/4
9	8	143/9	158/8	176/5	198/4	223/8
9	10	158/4	175/9	196/11	222/6	255/9
10	5	133/4	145/4	159/6	177/3	196/11
10	8	163/9	181/4	202/4	228/1	255/7
10	10	185/8	207/–	232/9	264/5	309/8
12	6	181/5	197/3	216/5	239/9	263/5
12	9	216/1	238/5	265/3	298/1	336/1
14	6	210/4	229/5	252/4	280/5	315/4
14	9	250/11	277/5	309/3	348/4	395/9
15	7	231/–	253/4	280/1	313/–	350/11
15	8	246/4	271/5	301/8	338/3	383/–
15	10	274/7	304/11	341/1	385/8	431/4

Note.—For Blinds without fittings, material only, deduct—

Width	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.	13 ft.	14 ft.	15 ft.
	29/5	31/3	34/1	39/5	41/3	61/7	66/3	69/7	73/1	76/5

"ABERDEEN" FLORENTINE BLINDS—COMPLETE WITH ALL FITTINGS.

Made to required sizes—Approx. Prices.

Size		12 oz. duck	15 oz. duck	18 oz. duck or green waterproof,	Plastic Stripe waterproof duck	Deduct without fitting
Width	Drop					
6	5	149/3	157/11	168/8	183/7	84/9
6	7	164/9	176/3	190/5	210/5	84/9
8	5	180/3	192/5	207/9	225/11	90/5
8	7	195/5	210/8	229/7	255/–	90/5
10	5	204/8	219/11	238/9	264/3	95/11
10	7	225/3	244/4	267/9	299/7	95/11
12	4	222/5	236/9	254/4	274/–	117/1
12	6	242/8	261/4	283/4	306/3	117/1
14	4	243/11	260/1	280/1	301/4	124/–
14	6	274/7	296/7	323/7	365/8	124/–

CANTILEVER SHOP AWNING BLINDS—"ABERDEEN"

Shop Awning Blinds are made complete ready for erection, with Batten, Octagon Roller, Pulleys and Cords. Each Blind is fitted with 12-inch Scalloped braided flap. Makers can supply heavy steel Hook Arms—see prices below. Easily erected. Drill four holes into awning fascia and bolt hooks to fascia. Made to required sizes.

Approximate Prices.

Size Width drop	15 oz. duck	18 oz. duck or green waterproof.	Plastic stripe multi-coloured waterproof duck	**Recovers only.** If no fittings required deduct from prices
10 x 4 ...	145/11	179/8	176/9	59/4
12 x 4 ...	193/9	213/7	210/4	69/9
16 x 4 ...	259/9	286/9	282/1	86/3
18 x 4 ...	280/5	310/–	304/11	94/5
10 x 5 ...	183/5	203/9	200/7	59/4
12 x 5 ...	213/4	236/11	232/9	69/9
16 x 5 ...	284/1	315/9	310/5	86/3
18 x 5 ...	304/11	339/–	333/3	94/5
10 x 6 ...	199/9	223/4	219/4	59/4
12 x 6 ...	225/7	251/4	247/–	69/9
16 x 6 ...	302/5	337/7	331/8	86/3
18 x 6 ...	329/4	368/3	361/7	94/5

Steel Hook Arms for above blinds.—$\frac{3}{4}$ x 3′, $\frac{3}{4}$ x 4′, 45/– per pair. $\frac{7}{8}$ x 5′, 48/7 per pair; $\frac{7}{8}$ x 6′, 52/– per pair.

OUTFITS FOR CAMP WORKERS.

"ABERDEEN" CALICO AND DUCK TENTS.

No.	Quality	6′ x 8′ Walls 3 ft.	8′ x 10′ Walls 3 ft.	10′ x 12′ Walls 3 ft. 6 ins.	12′ x 14′ Walls 3 ft. 6 ins.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
1.	Medium Tenting	4 3 9	5 14 11	7 2 5	9 4 9
2.	Heavy Tenting	5 2 9	6 12 3	8 14 9	10 15 0
3.	Extra Heavy Tenting ...	5 15 9	7 9 0	9 17 5	12 3 1
	10 oz. Pure Duck	11 19 9	15 9 1	20 14 5	25 11 7

"ABERDEEN" CALICO AND DUCK FLYS.

No.	Quality	9′ x 11′	12′ x 12′	14′ x 14′	14′ x 16′	15′ x 15′	15′ x 16′	16′ x 16′	18′ x 18′
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1.	Medium Tenting ...	2 7 7	3 4 7	4 1 11	4 14 4	4 15 1	5 2 0	5 7 10	6 12 8
2.	Heavy Tenting ...	2 15 4	3 14 3	4 15 4	5 9 9	5 10 3	5 18 4	6 4 9	7 13 4
3.	Extra Hvy. Tenting	3 1 11	4 3 9	5 9 11	6 4 5	6 5 1	6 14 3	7 1 9	8 14 8
	10 oz. Pure Duck ...	6 3 9	8 13 4	11 15 3	13 5 3	13 6 3	14 6 0	15 0 3	18 15 10

THE "ABERDEEN" NEWPORT STRETCHER.

This Stretcher is made from seasoned Australian timber, and has a heavy Duck Top, with centre legs jointed together with metal bracket; ideal where a reasonably priced Stretcher is required.—**Price,** £2 5s. 0d.

TENT SPRINGS.

Sturdy galvanised, heavy-gauge Tent Springs—invaluable to every tent user. Allow for shrinkage of guy ropes and take all the strain.—17/4 per dozen.

See Advertisement Page 47.

CARTAGE AND TRANSPORT

CARTAGE AND TRANSPORT.

The cartage rates for various building materials have been included in their own headings for the convenience of tenderers.

DISTANCES BETWEEN PORTS OF AUSTRALIA (in Miles).

Fremantle.										
1378	**Adelaide.**									
1886	508	**Melbourne.**								
2450	1072	564	**Sydney.**							
2960	1582	1074	510	**Brisbane.**						
3310	1933	1424	860	350	**Keppel Bay.**					
3500	2122	1614	1050	540	190	**Mackay.**				
3605	2227	1719	1155	645	295	105	**Bowen.**			
3708	2330	1822	1258	748	398	208	103	**Townsville.**		
3868	2490	1982	1418	908	558	368	263	160	**Cairns.**	
3903	2525	2017	1453	943	593	403	298	195	35	**Port Douglas**
3968	2590	2082	1518	1008	658	468	363	260	100	65 **Cookt'n**

N.S.W. RAILWAYS

MATERIALS TRANSPORTED BY THE VARIOUS RATES.

Miscellaneous (Wagon Loads).

Asbestos, asbestos cement slates, sheets, barge boards, ridgings, mouldings and cover strips, bricks building or hollow bricks, fire bricks and fireclay blocks, cement (35 and 30 ton lots), cement partition blocks, concrete and cement blocks and slabs, earthenware pipes (agricultural drain unglazed), fencing posts (reinforced concrete—full truck loads—M rate + 33⅓ per cent.), fencing wire black including barbed and standards (M rate + 33⅓ per cent.), fibrous plaster wall sheets, ceilings, mouldings, gravel road (small lots), lead (ingots and pig), lead scrap, lime, plaster, sinks (salt glazed), stone (dressed and undressed), terra cotta, lumber, tiles (roofing, paving, wall, flooring), timber logs (to mills—M rate + 10 per cent.), timber (sawn and/or dressed—M rate + 10 per cent.), urinal stalls (salt glazed,) wire netting.

Special A (smaller quantities).

Asbestos, asbestos cement slates, sheets, barge boards, ridging, mouldings, and cover strips; bitumen, bricks (building or hollow) glazed or enamelled, fire bricks, fireclay blocks, cement (10 and 6 ton lots), concrete and cement blocks and slates (8 and 6 ton lots), fencing posts (reinforced concrete—8 and 6 ton lots), fencing wire—black including barbed (less than truck loads), fibrous plaster wall sheets, ceilings, mouldings; lead (ingots and pig), lime (4 ton lots) plaster (6 ton lots), pottery—common clay—including chimney pots, air bricks (unglazed and glazed) truck loads, sisal fibre, stone (dressed, undressed, polished or carved), terra cotta ware (truck loads), tiles (roofing, paving, wall, flooring), timber sawn or dressed, wire netting.

Special B.

Bitumen cement, bulldozers, cement (small lots), cement plaster and solution, concrete and cement blocks (small lots), creosote oil, earthenware (not otherwise specified), small lots packed, felt roofing or insulation (10 and 8 ton lots) felt paper, fencing posts concrete—small lots, fencing wire galvanised (truck loads), house walls (timber sections) 8 ton lots; galvanised—terne coated or zinc annealed building sheets packed (truck loads); iron and steel rolled angles, bars, plates, hoop, sheet (truck loads), lime (small lots), machinery, machines—mechanically driven or parts (not otherwise specified), plaster (small lots), stone—polished and carved (small lots), terrazzo steps, terra cotta ware (small lots), wallboards—pulped wood—paper—cane or roots (truck loads), fencing wire galvanised, wood preserving oil, zinc annealed sheets packed.

Special C.

Asbestos cement downpipes, guttering and roof vents, asbestos millboards, asbestos jointing, baths—iron and steel, bath heaters—iron and steel, bolts, nuts, screws, washers—iron and steel, cork boards, dampcourse (not otherwise specified), felt roofing and insulation (small lots), houses—timber sections (6 and 4 ton lots), houses—iron and steel (10 and 8 ton lots), galvanised—terne coated or zinc annealed, building sheets (small lots) packed, also loose truck loads; iron and steel rolled angles etc. as B rate list but smaller lots; iron and steel manufactured or cast, baths, bath heaters, bearers, belts, brackets, bridgework cantilevers, channels (rolled joists or beams), columns (wrought or cast), crow bars, dog spikes, down pipes, flues or pipes for fireplaces, furniture, gates, girders (fitted or fabricated), grease traps, guttering, nails, nuts, pipes or piping, ridging, roofwork, safes, sanitary pans, sashweights, screws, sinks, stoves, tubes, tubs, washers, weights, wall ties; all the above iron and steel manufactured or cast in truck loads, metal ceiling sheets, slagwool, wallboards—pulped wood—paper—cane or roots (small lots), zinc annealed sheets loose (truck loads).

First Class.

Barrows and barrow wheels or part thereof, bath bricks, houses (sections) small lots, houses (iron and/or steel) small lots, wood houses portable in parts, ice houses in parts, galvanised terne coated or zinc annealed building sheets (small lots) loose, iron or steel baths, etc—wall ties as C rate, but smaller quantities, tiles (ornamental and tesselated), wheelbarrows, zinc annealed sheets loose (small lots).

Second Class.

Baths, bath heaters, bolts, nuts and screws, and washers (other than iron or steel), Bricks (glass), metal air bricks, chimney pieces, chinaware (not otherwise specified), crab winches, dampcourse lead or copper, earth closets and closet pans, earthenware (small lots) unpacked, felt (not otherwise specified), guttering, tubing and piping (zinc or lead), insulwool (conditional), ironmongery (not otherwise specified), Joinery (not otherwise specified), kalsomine, lead sheets, lead piping, white lead, red lead, linoleum, locks, nails (copper and brass), paints, paint colours, paint remover, wallpaper, picks, pipes (copper, lead, brass), zinc or tin pipes, putty, rope, sandpaper, sanitary pans, saws, washing boilers (not otherwise specified), wires and cables (insulated).

RAILWAY TRANSPORT.

The transport of goods by rail comes under the following :—

"M" Rate for miscellaneous wagon loads.

"A" Rate for 2 ton lots ; "B" Rate for 1 ton lots ; "C" Rate for 1 ton lots—First Class : Second Class.

A minimum freight charge is levied on goods weighing less than 3 cwts.

Minimum Weights Charged for under the various Rates.

"M" Rate—8 tons per four wheeled Railway wagon. K, KH and U Type Wagons—10 tons minimum.

Wagons of carrying capacities 8 tons or less, the full carrying capacity less 2½ per cent. is charged.

"A" Rate—Less than 2 tons charged as "B" Rate.
"B" „ „ 1 ton „ „ „ First Class.
"C" „ „ 1 „ „ „ „ „ „

First Class and Second Class—Actual Weight Charged.

The minimum weight for 15 ton "S" and "SS" wagons loaded at Darling Harbour or Alexandria will be 12 tons.

RAIL CHARGES FOR VARIOUS DISTANCES.

Distance Miles.	Miscellaneous Wagon Loads	A two ton Lots.	B one ton Lots.	C one ton Lots.	1st Class.	2nd Class.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
50	18 0	1 4 1	1 14 5	2 8 3	2 9 7	3 2 0
100	1 12 0	2 3 3	3 1 8	4 6 2	4 15 9	6 1 3
150	2 1 4	2 15 10	3 19 9	5 11 8	6 15 3	8 4 2
200	2 10 11	3 8 7	4 17 9	6 17 1	8 11 6	10 6 11
250	2 13 8	3 14 11	5 6 11	7 9 10	9 14 7	11 13 3
300	3 0 3	4 1 3	5 16 0	8 2 4	10 10 10	12 13 0
350	3 3 11	4 6 4	6 3 3	8 12 6	11 4 1	13 8 10
400	3 7 9	4 11 3	6 10 5	9 2 9	11 17 2	14 4 1
450	3 11 3	4 15 10	6 16 10	9 11 6	12 8 10	14 18 7
500	3 14 7	5 0 1	7 3 3	10 0 5	13 0 4	15 12 4
600	4 0 1	5 7 10	7 14 1	10 15 9	14 0 1	16 16 1
700	4 4 9	5 14 3	8 3 1	11 8 3	14 16 6	17 15 10
800	4 9 5	6 0 5	8 12 4	12 1 1	15 13 1	18 15 6
900	4 14 1	6 6 11	9 1 3	12 13 9	16 9 6	19 15 4

REFRACTORY INSULATING WATERPROOF CEMENTS

REFRACTORY CEMENTS.



Unlike fireclay which shrinks and hardens only at the face exposed to the flame, Refractite gives an exceptionally strong, uniform, gas-tight spalling-resistant joint. The airtight joint is stronger than the firebricks.

Refractite Air Setting Fire Cement. Weight 120 lb. per cu. foot.—An acid-resistant fire-cement, in paste form. Hardens with temperature increases. A gas-tight, fire-proof joint is developed.

Uses : Bonding agent for fire-brick work to temperatures up to 1400°C. Adheres to metal, glass or stonework. Used with crushed fire-brick to make special shapes, boiler baffles or repairs. A brush coating gives a protective surface to exposed fire-brick.

Use 500 lb. per thousand 9 in. x 4½ in. x 3 in. bricks.—Price, 42/9 per cwt.

Refractite Self-Setting Ramming Cement.—In powder form with the bonding liquid with which it is mixed prior to use. A cold, hard, hydraulic set which is maintained over a temperature range to 1,300°C. Useful for forming linings or repairs to furnaces in situ.

Mix powder with bonding liquid to consistency of damp sand.

Quantity Data : 1 cu. ft. of the set cement requires 100 lbs. of powder.—Price, 42/9 per cwt.

Refractite Fireplace Cement.—Price 42/9 per cwt. For repairing broken or cracked firebacks, setting firebricks or wherever a heat-proof joint is required.

Air sets to a rock-like joint or repair which becomes hard in contact with the flame.

The fireplace can be dried out immediately with a slow wood fire.

For thin joints use straight ; thick joints mix 1½ vol. of sand.

Thermolox.—A partial cold-setting high temperature fire-cement. Powder form used in all general fire-brick work where a strongly adhesive tight joint is not essential. Mix with water before use.

QUANTITY DATA : Use 500 lb. per 1,000 bricks. Price 26/– per cwt.

Pyrolute.—A heat and acid-resisting furnace putty. For use in lining, jointing, patching and sealing. Suitable for lining metal tubes, protecting metal work from high temperatures, lining metal joints in stove furnaces.

QUANTITY DATA : Wt.—128 lbs. per cu. ft.—50/9 per cwt.

Silfractite.—A fire cement in powder form. Mix with water to a trowel consistency. Resists abrasion and corrosion, particularly of acidic slags. Recommended for bonding, setting and coating refractories of siliceous or semi-siliceous nature, covering all temperature ranges up to 1650°C. The higher the temperature the stronger the bond developed.

QUANTITY DATA : Use 500 lb. per 1,000 bricks. 37/6 per cwt.

Carbolox (Silicon Carbide) Super Refractory Cements.—The two main classes are Carbolox No. 1 for temperatures up to 1,800°C. and Carbolox No. 2 for temperatures up to 1,650°C.

The heat conductivity—nine times that of fireclay—high resistance to thermal shock, abrasion and acid slags, valuable where extreme furnace conditions exist.

USES : Recommended for setting, coating and patching all silicon carbide bricks and shapes, such as " Carbolox ". Must not be used where basic or ferruginous material is present. Typical applications are for setting tiles, bricks, shapes in muffle furnaces for enamel work, by-product coke ovens, oil and gas-fired furnaces, for heat treatment and metal melting, etc.

QUANTITY DATA : Use 500 lb. per 1,000 bricks.

In addition Carbolox ramming cements No. 1 and No. 2 are available for ramming into moulds, moulding into special shapes, or ramming in situ in the furnace behind solid forms. 1 cub. ft. of rammed cement=155 lbs. Carbolox. Price, 150/9 per cwt.

Mullox P.B.S. Air-Setting Jointing Cement.—Air sets at normal temperatures, giving a strong, hard, dense gastight spalling-resistant joint over a wide temperature range to 1,500°C. The joint is stronger than the brick itself.

USES : Either alone as a cement and coating or in conjunction with crushed firebrick for patching, repairs, special shapes, etc.

Use 550 lbs. Mullox P.B.S. per thousand bricks. Price 46/– per cwt.

Mullox P.B.S. Self-Setting Ramming Cement.—Supplied in powder form with bonding liquid with which it is mixed prior to use. Gives a cold, hard, hydraulic set over its temperature range to 1,400°C. Useful for making repairs to furnaces in situ. The powder is mixed to the consistency of damp sand.

QUANTITY DATA : 1 cub. ft. of Set Cement requires 120 lbs. of powder. 51/6 per cwt.

Mullox P.B.S. Heat-Setting Jointing Cement.—For temperatures up to 1,700°C., supplied in powder form for mixing with water. Recommended as a bonding cement for firebricks subject to elevated temperatures and slag conditions. Recommended for setting Mullox bricks or repairs.

Use 500 lbs. per thousand bricks. 46/– per cwt.

REFRACTORY CEMENT AND CONCRETE.

Mullox P.B.S. Heat-Setting Ramming Cement.—Plastic Refractory for moulding into special shapes, or ramming in situ in the furnace. The dry powder form for mixing with 9 lbs. water per 100 lbs. powder. One cubic foot weighs 135 lbs. Fusion point is 1,700°C.

Extensively used for boiler linings. 46/– per cwt.

Alutite.—A super refractory cement, for use up to temperatures of 1,800°C. (3,272°F.) in powder form in both coarse and fine grades. For electric furnaces, metallurgical furnaces, crucible furnaces, etc. Mix with clean water.

Use 550 lb. per 1,000 bricks. 142/– per cwt.

Chromefractite.—A cold-setting cement, for bonding and coating work to 1,600°C. temperature in form ready for use. Used with basic, acidic or neutral refractories where basic refractories have to be bonded with acidic refractories or vice versa. Resistant to fusible coal and briquette ash, clinker, low melting fluxes, etc., a general purpose bonding and coating protection.

Use 700 lb. per 1,000 bricks. 53/6 per cwt.

Pyrocrete.—Refractory Concrete.

Uses : Furnace and door linings, door arches and jambs, burner blocks, furnace ports, boiler base work, chimney stacks, ladle pits, ash-pit linings.

One cu. ft. of set material requires Standard 110 lbs. 39/– per cwt.

HEAT AND SOUND INSULATING CEMENTS.

Insulox Lagging Cement.—Temperatures up to 500°C. Powder. Mix with water. 37 lbs. dry per cub. ft.

Uses : heat insulation lagging or coating for boilers, steam pipe, ovens, etc. 25/– per cwt.

Insulox Granules.—Insulating backing for the walls or roofs of furnaces, and with Portland cement or Aluminous cement for Insulox Concrete. Insulox Concrete is used for insulating furnace and kiln, foundations, furnace doors, roofs, etc.

One cu. ft. weighs 25 lb. Insulox Concrete. Use 1 vol. of cement to 4 vols. of Granules. 40/6 per cwt.

Airseal Mastic.—Waterproof mastic for air-sealing suitable for trowel application. For application to external walls of brick boiler settings to render them airtight. Used as a waterproof coating over pipes, boiler insulation.

Use 30 sq. ft. per gallon, $\frac{1}{16}$ in. thick. 10/6 per gallon.

INSULATING CEMENTS—HEAT AND SOUND.

Micalox. (An expanded Vermiculite Heat Insulator).—Temperature range to 900°C.

Use : As a loose fill heat insulating and acoustical packing for roofs, walls, etc. Also as an insulating concrete when mixed with cement. 65/– per cwt.

Micalox Lagging.—Use : As a heat-insulating coating or packing in oven, boiler and furnace construction. Weight dry, 25 lbs. per cub. ft.

Coverage : 50 sq. ft. 1 in. thick for 1 cwt. 74/– per cwt.

ACID-PROOF CEMENTS.

Ceramic Acid-Proof Cement is available in two forms :—

Standard.—General usage ; rapid set—for urgent repiars.

The " S " grade sets in approximately 30 minutes.

Uses : For acid-proof jointing of bricks and tiles, and the construction of walls, floors, chimneys, sewers, tanks, chemical equipment, etc. When lining concrete tanks subject to strong acid, first apply a seal of Permelastic.

Use 10 lb. of powder with 5 lb. of bonding liquid, $3\frac{1}{4}$ quarts powder and $1\frac{1}{4}$ of liquid. Use approximately $\frac{1}{2}$ lb. per brick. 48/9 per cwt.

Acid-Proof Cements.—Bituminous Base.

Uses : Permelastic " AA " cements are for acid-proof lining and coating for floors and walls of tanks, wood seasoning kilns, pipes, acid towers, dye vats, etc.

The Solid form is for hot application, e.g., filling joints in walls and floors of acid-proof brick construction, acid-proof floor coating, etc.

Quantity Data :—

Primer—150 sq. ft. per gallon
Brush—50/100 sq. ft. per gal. 1 coat
Trowel—30 sq. ft. $\frac{1}{16}$ in. thick
Caulking—80 ft. $\frac{1}{2}$ in. x $\frac{1}{4}$ in. joint per gal.
} 11/6 per gallon.

Solid—$7\frac{1}{2}$ sq. ft. per gal. $\frac{1}{4}$ in. thick. 10/6 in 4 gal. 9/9 in 40's.

Anti-Corrosive Aluminium Coating.—A waterproof, chemically resistant, anti-corrosive, processed, black base and special leafing grade of Aluminium powder.

When coating ungalvanised iron subjected to salt spray, corrosive fumes, etc., first prime with PERMELASTIC PRIMER.

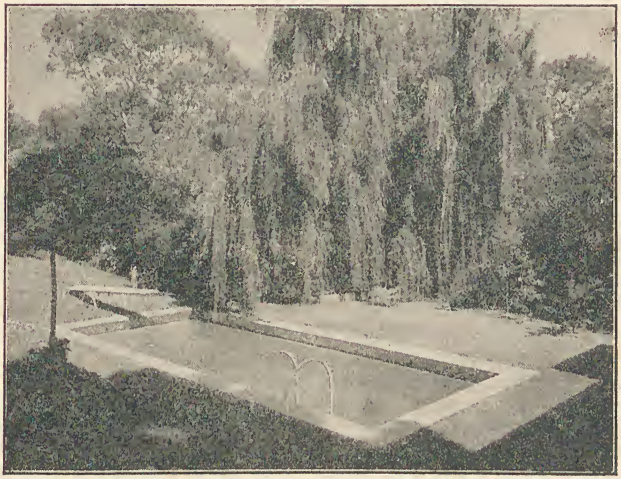
Also available in green, red and brown.

Covering capacity, 50–60 sq. yds. per gallon one coat. 46/– per gal.

See Advertisement, Page 42a.

WATERPROOFING AND CAULKING

INTEGRAL WATERPROOFING.



Swimming Pool, Toorak. Waterproofed with Nonporite No. 2 Paste.

Nonporite No. 2 Paste.—USES : For waterproofing mass concrete, cement render, cement mortars, above or below ground level, against any water pressure : for waterproofing basements, lift-wells, tanks, swimming-pools, reservoirs, fish ponds, floors, walls, foundation dampness, parapets, flat roofs, etc.

Use 1 quart to each cu. ft. cement used in the render, or concrete mix. 15/– per gal. 12/6 in 4's.

Nonporite No. 3 Liquid.—For waterproofing mass concrete, cement renders and mortars, and for quick setting mixes. For concrete basements, tanks, wells, reservoirs, floors, etc., and sub-grade render work only.

Use 1 quart to each cu. ft. of cement used in the render or concrete mix.—16/6 per gal. 14/– in 4's.

SURFACE WATERPROOFING.

Nonporite No. 1 Liquid.—For waterproofing exposed exterior surfaces of brick, stone or cement.

Apply in two to three separate coats to clean and dry surfaces only. Averages 120 sq. ft. per gallon. Should be applied at a temperature above 65°F. 23/– per gal.

Accelacrete.—An hydraulic cement accelerator. For use with concrete where it is desired to quickly strip forms, moulds, etc.

Use 1–2 qts. to each cubic foot of cement used. 9/6 per gal.

Elastic Caulking Compound.—Weather-sealing plastic caulking, pointing and jointing compound. For caulking cracks in masonry work, sealing window frames (especially steel), expansion joints in concrete work, a waterproof seal arouud steelwork in concrete, setting glass bricks, pointing stone and terra-cotta work; for bedding glass and metal work to eliminate vibration, etc. 2/8 per lb. or 2/– in 16 lb. tins.

Permelastic Caulking.—For sealing joints in concrete roof slabs, floor work, roof repairs, etc. Colour, BLACK only. 11/6 per gal.

Metalcote.—A metallic floor hardener. Used with cement and sand or bluestone screenings for the production of hard, oil-proof, dust-proof, anti-slip concrete floors.

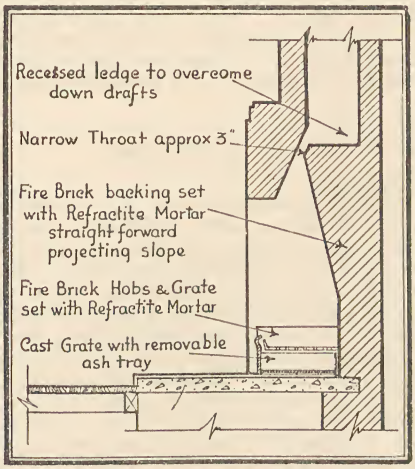
Use 8 lb sq. yd. 4½d per lb.

Sicalcote.—An anti-slip, non-metallic cement floor hardener; consisting of fused aluminium and silicon carbide. Used with sand and cement or blue-stone.

Use 2–3 lb. per sq. yd. 11d. per lb.—1/3 per lb. coloured, buff, brown or red.

Nonporite Ceramic Acid-Proof Cement.—A silicate acid-proof cement for jointing acid-proof bricks or tiles to a concrete floor which has preferably been previously coated with Permelastic, a resilient bituminous mastic. 48/9 per cwt.—8d. per lb.

See Advertisement Page 42a.



Cross-section of fireplace showing correct design to overcome down drafts and secure freedom from smoking. Brickwork permanently bonded with Refractite Fireplace Cement.

CEMENT AND CONCRETE

1. CONCRETE—ITS NATURE AND HOW TO MAKE IT.

Concrete is made by binding together, by means of Portland cement and water, particles of sand and gravel, broken stone or other inert substances known as aggregates.

MIXING AND POURING.

1. Calculate exactly how much concrete will be required.
2. Ascertain how much cement, sand, coarse aggregate and timber for forms will be required.
3. Choose good materials and, if necessary, wash the sand and coarse aggregate ; use only clean water for mixing purposes.
4. Construct the " forms " in position. Forms should be clean, and must be greased or oiled.
5. Carefully measure quantities of materials for concrete. Batches should not be too large.
6. Mix materials thoroughly. Avoid sloppy mixes. Use sufficient water to make a plastic or workable mix, and no more.
7. Wet the surfaces of foundations with water before placing concrete.
8. Place concrete in position as soon as possible after mixing, and tamp well and spade edges adjoining the forms.
9. Do not over-trowel or over-" float " concrete surfaces, or use mortar which is too rich in cement, for surfacing.
10. Protect concrete from drying out. Keep it wet for the specified period. Do not remove " forms " until the concrete is hard.

Inferior concrete is sometimes wrongly attributed to lack of quality in cement, when it is sometimes the outcome of unsuitable aggregates or careless workmanship in proportioning, mixing, placing, or curing.

2. MATERIALS.

(a) Portland Cement :

Portland Cement is manufactured by mixing and intimately grinding together calcareous and argillaceous and/or other silica, alumina, or iron oxide-bearing materials (generally limestone and shale), burning them at a clinkering temperature, and grinding the resulting clinker in a ball mill. Australian cement is manufactured in accordance with a specification issued by the Standards Association of Australia (A.S. No. A2–1948), and is scientifically tested in accordance with this specification before it leaves the cement works.

Three types of Portland cement are manufactured in Australia, viz.—Normal Portland, High-Early-Strength, and Low-Heat cements ; the characteristics and uses of these special cements are frequently not appreciated. Ordinary Portland cement develops 75–80 per cent. of its ultimate strength in 28 days under favourable curing conditions—this is adequate for all normal works, but where high strength at an early age is essential High-Early-Strength cement should be used. With similar mixes and curing conditions it gives approximately the same strength at 1 day, 3 days and 7 days respectively as normal cement does at 3 days, 7 days and 28 days. It is not a " quick-setting "

cement ; it takes the same time to " set " as normal Portland cement, but develops strength much more rapidly. Low Heat cement, on the other hand, develops its strength more slowly than normal Portland cement. Rate of heat evolution and temperature rise in mass concrete work are reduced, thereby reducing tendency to cracking from thermal expansion. It is important to remember that all Portland cement concretes of similar mix will ultimately develop the same strength ; the only difference is in the rate of development.

When a quick " set " is required, an accelerator must be used. Their use is not recommended unless absolutely essential.

It is essential that Portland cement be stored in a dry atmosphere, and thoroughly protected from rain and from ground dampness.

(b) Aggregate :

The term " aggregate " is somewhat loosely used. Sometimes it refers to the coarser particles of the material as distinct from sand but, strictly speaking, it includes the sand or " fine aggregate."

(i) **Sand :** Any sand, which is clean and free from earth, will make concrete ; but the quality of concrete will be affected by the type of sand used. The ideal sand is one in which the particles are graded from coarse to fine with coarse predominating. The reason is that if particles of gravel or broken stone are piled together, there will be spaces or " voids " between them. If smaller stones are mixed with them the voids will be partially filled, and if coarse sand be added it will practically fill the voids between the stones ; but again, there will be small voids between the particles of sand. If these in turn are filled with finer sand, the voids will be reduced to a minimum and thus the amount of cement, which not only has to coat all the particles of aggregate, both coarse and fine, but must also fill the voids, is reduced to a minimum, while the resulting mass is compact and strong.

Failing a graded sand a coarse sand is preferable, although good concrete can also be made with fine sand. If the sand is fine, however, the particles will present a much greater total surface area than that of a coarse sand and will, in consequence, require considerably more cement to coat them. A coarse sand is therefore desirable to give maximum strength with economy in use of cement, but may give a pervious concrete.

It is often specified that the sand shall be " sharp "—i.e., that the particles shall be angular. Tests have shown that this is unnecessary. If river, lake or sea sand can be obtained conveniently, it may be used. The objection to this type of sand is that it is often too fine, and the grain size too uniform : salt contained in sea sand also retards the setting and hardening of concrete, but does not affect its ultimate quality. Salt, too, is apt to cause efflorescence (a white deposit) on the finished surface ; this may be removed by washing with a weak solution of hydrochloric acid, but the trouble is likely to be a recurring one. Foreign matter such as clay prevents the cement from coating and bonding the particles, and results in weak concrete. Small amounts of silt may not be objectionable provided they do not contain organic matter of either vegetable or animal origin. In rich mixes where the cement supplies sufficient fine material, silt introduced with the sand will result in a loss of strength ; in lean mixtures deficient in fine

material, small amounts of silt or metal dust may improve the strength. Sand which contains silt not exceeding 5 per cent. by weight can be used safely. A " dirty " sand can sometimes be detected by rubbing a sample between the hands and observing the staining effect, but a better test is to stir a handful of sand with water in a glass jar when the loam or clay will, on settling, form a layer by itself. If the height of sediment above the sand is more than 5 per cent. of the height of sand, the material should be viewed with suspicion.

A simple way of washing sand for small jobs is to make a trough, 8 to 10 ft. long, from plain boards. Put the sand in the trough and, while gently stirring the material, let a stream of water run through it either from a tap or hose. The water will carry away particles of dirt, and the sand will remain.

(ii) **Coarse Aggregate:** Selection of the aggregate is important because upon its strength and hardness depend the strength and hardness of the concrete. Choose a well-graded material containing a proportion of all sizes of particles, from the largest permitted by the class of work down to about $\frac{3}{16}$ in. (or equal to the largest grains of the sand).

A good aggregate must be clean, well-graded, and hard. Clean, i.e., free from clay, loam or vegetable matter; well-graded so as to fulfil, on a larger scale, the same functions as graded sand; and hard, to impart strength and to resist abrasion. If watertight concrete is required the aggregates must themselves be impervious.

Aggregates most suitable for making good concrete are crushed stone such as granite and blue metal, gravel, and graded ballast; other materials, such as coke-breeze, cinders, clinker and broken brick may be used for certain purposes provided that they contain no deleterious matter.

Gravel contains a varying quantity of sand, and therefore cannot be used as though it were all coarse aggregate. Such material should be " screened " through $\frac{3}{16}$ in. mesh, when the sand will pass through. The two materials can afterwards be mixed in the proper proportions.

Broken brick is often quite a good material, but care should be exercised as some bricks contain sulphur and unslaked lime, and others possess characteristics which render them unsuitable for concrete. Where they are to be employed local experience should be consulted, and only a hard-burned variety selected.

Blast furnace slag sometimes affords an economic source of aggregate. The slag used should be uniform in quality, free from metallic iron, dirt and other objectionable matter. Slag produces a harsh working mix, particularly when it is used for both fine and coarse aggregates. This deficiency can be overcome by increasing the proportion of slag sand, or by adding other sand or fine material.

Cinders, which must not be confused with coke breeze, are often used as aggregate, and should be obtained from industrial plants, gas works, locomotives or similar sources where a large amount of coal is burned. This usually entails uniformity of coal and efficient firing, with the result that the cinders do not vary greatly. Residue from small domestic furnaces is not suitable.

The combustion process is incomplete, and the residue contains carbon as coal or coke, or both. Various sulphur compounds may be present in cinders, but not in readily reactive form. Corrosion of embedded steel in cinder or sand-cinder concrete has been blamed on sulphur, forming acid to attack the steel. The use of cinder and breeze aggregates should be avoided in reinforced concrete.

Coke breeze is used as a light-weight aggregate, but breeze concrete does not possess the strength of cinder concrete. Its main virtue is its lightness, although generally the same requirements apply to breeze as to cinders. There are other light aggregates, mostly of a proprietary nature such as " Unifil " : such materials are used for concretes where low thermal transmittance is of primary importance, and strength of secondary importance.

Size of Coarse Aggregate :

The maximum size of the coarse material should be varied according to the purpose for which the concrete is to be used ; but grading within the size range is always necessary.

For mass concrete, foundations or large structures, pieces up to 2½ in. may be used. For plain concrete largest particle of aggregate should not exceed one-quarter of the thickness of the work, but in reinforced concrete work this size should be decreased when disposition of reinforcing steel makes placement difficult.

(iii) **Mixing Water :** Impure water may considerably affect the properties of the resulting concrete. A good rule is to use only water that is suitable for drinking purposes. Sea water may be used, but it retards the rate of hardening of the concrete.

3. PROPORTIONING AND QUANTITIES.

The ideal of good and economical concrete is to make it strong and durable enough for the particular work in hand, but not to make it of any better quality than is definitely required.

The correct proportions of water, cement, sand and coarse aggregate depends on the nature of the work for which the concrete is intended, and on the character and condition of the aggregates. Not only must the hardened concrete conform with job requirements, but the plastic mix must possess satisfactory " workability ".

Strength and other desirable qualities of concrete vary inversely with the water/cement ratio—hence, mixes should be as dry as possible consistent with suitable workability.

Table given in MEMORANDA, Section 3 (c) will serve as a guide to suitable proportions and quantities of materials.

If the mix appears to be over-sanded, reduce sand and increase coarse aggregate.

If the mix appears to be too harsh, increase sand and reduce coarse aggregate.

If any attempt is made to increase " fluidity " of mix by increasing the water content beyond a certain limit, concrete will be weakened and subject to segregation in handling and placing.

On large jobs, where very high quality concrete is required, more scientific methods of mix design (or proportioning) may be used ; such methods result in better and more economical mixes.

4. MEASURING MATERIALS.

Proportioning on small jobs is commonly by volume, on the basis that 1 bag of cement = 1 cubic foot; measuring boxes—see MEMORANDA—Section 3 (a) for Dimensions—are normally used for sand and coarse aggregate. When proportioning by volume it must be remembered that 1 cu. ft. of dry sand becomes 1·2-1·4 cu. ft. of damp sand (6 per cent.-10 per cent. moisture).

Proportioning by weight gives more accurate control, and is usual on large jobs and in central mixing plants. It can be readily employed on smaller jobs by the use of platform scales with small barrow ramps, due allowance being made for weight of barrow.

Water should always be accurately measured—either by volume or by weight—and never added by guesswork.

5. MIXING.

Mixing may be done by hand, but should preferably be done by machine, either hand or power operated.

Hand mixing should be carried out on a level, paved floor or timber platform. In the latter case the boards must be smooth and free from holes, and close jointed to avoid loss of cement paste.

Hand Mixing.

Equipment—shovel, measuring box(es), water can, platform.

Method — (i) Sand measured and spread on board.
(ii) Cement spread over sand.
(iii) Sand and cement turned over with shovels until thoroughly mixed and of uniform colour throughout.
(iv) Coarse aggregate measured, spread on top, and mixing process repeated until colour again uniform.
(v) Water added slowly in depression in centre, and mixed as added until whole has a quaky, jelly-like consistency.

Regard first batch as a trial batch; if not satisfactory, vary proportions as recommended in Section 2 above.

Machine Mixing.

Machine mixing should be done in an approved type of mixer—usual capacities 3½, 7, 10, 13 cu. ft. Normal running speed for efficient mixing approx. 20 r.p.m. A mixing time of 1½ to 2 mins. after addition of all materials is recommended.

For mixing "dry" mixes of the consistency used in the manufacture of concrete bricks and blocks, tiles, etc., a special type of power mixer is required—this may be a continuous mixer, a paddle-type or pan-type mixer. Attempts to mix a "dry" mix in a normal type mixer will result in "balling" of the mix, and an unsatisfactory product.

6. TRANSPORTING.

For small jobs the concrete is usually barrowed from the mixer or hoist to its final position. If the concrete has been badly proportioned, or mixed too wet, difficulty is experienced in emptying the barrows—the heavier particles settle and pack in the bottom of the barrow so causing segregation. Concrete which has been properly proportioned and mixed will leave the barrow easily; it is possible to judge fairly correctly the quality of a concrete mix simply by watching its placing from barrows.

For larger work concrete buggies or rickshaws are commonly used. Because of the relatively large weight of concrete to be moved in these units, scaffolding or buggeyways should where possible be arranged to give a downgrade for full buggies.

For very large work installation of a concrete pump may be economical; these are particularly adapted to placing concrete in tunnel linings, or over rough ground.

Alternately, in high structures, the concrete may be elevated in buckets by means of a hoist tower, thence transported by barrows, buggies, or placed by chuting.

Concrete may also be placed from special bottom-dump buckets suspended from an aerial ropeway, stiff-leg derrick, etc.

7. PLACING AND COMPACTING.

Concrete made with normal Portland cement should be placed and compacted within half-an-hour of mixing in Summer and three-quarters-of-an-hour in Winter. It should be thoroughly spaded or rodded to work it around reinforcing steel and against faces of shuttering. Concrete should be uniformly placed along the forms, and not tipped at one point and worked along the form; this latter method leads to segregation.

A better compaction and surface finish of work is obtained by the use of vibrators. This also permits the use of a drier and hence stronger mix. Vibrators may be internal—working in the body of the concrete—or be clamped onto the formwork. Each type of unit is available with electric, pneumatic, or petrol engine operation.

Where possible, concreting should be completed in one operation. Where this is impossible the surface of the old concrete should be well chipped and/or brushed with a stiff wire brush before placing is resumed, and thoroughly washed to remove all loose particles. A layer of mortar $\frac{1}{2}''$ thick, of a composition the same as that of the new concrete but without coarse aggregate, and of a creamy consistency, should be well brushed into the prepared surface. The new concrete should then be placed immediately and well tamped against the joint.

8. CURING.

Concrete hardens due to the chemical action of hydration of the cement. This can occur only in the presence of sufficient moisture, and is greatly slowed down by low temperatures (say, below 50°F.).

Freshly placed concrete must therefore be prevented from drying too quickly, and must be protected from excessive cold, as frosts. This may be done by covering the concrete with earth, sand, bags, etc., and keeping same thoroughly wet for at least 7–10 days; by covering the surface with a waterproof tarred paper to minimise evaporation losses; by ponding water on the surface of the concrete or complete immersion of the concrete in water; or by sealing the surface of the concrete with an approved sealing compound—such materials generally take the form of wax or resin dissolved in a petroleum oil vehicle, or a bituminous emulsion.

Vertical surfaces may be cured by hanging hessian over them and keeping continuously wet.

9. WATERTIGHT CONCRETE.

That watertight concrete can be obtained by proper attention to a number of factors is amply demonstrated by the many concrete hydraulic structures—e.g., reservoirs, elevated water tanks, dams, etc., in use.

The essential requirements for watertight concrete are :—Sound aggregates of low porosity ; adequate fines in the sand ; limited amount of mixing water ; plastic, workable mixtures ; thorough mixing ; proper placing ; favourable curing conditions.

Admixtures such as hydrated lime, sodium silicate, etc., are often used in an endeavour to make watertight concrete. This objective can be achieved without any admix through proper attention to the above factors. Conversely, use of an admix without attention to these factors will not result in a watertight concrete.

Lack of watertightness is frequently due to structural cracking ; thus, where unequal settlement may be expected, it is necessary to provide a flexible waterproof membrane. Such a membrane acts as a seal to prevent leakage from cracks which may result from the settlement.

10. REINFORCED CONCRETE.

Concrete is strong in compression but comparatively weak in tension. Thus, where concrete members are called on to resist bending or tensile loads, the concrete is reinforced with steel bars. The job of determining the amount and disposition of reinforcing steel required is one for a specialist. The placing of the steel and its fixing in the required positions is important and the reinforcing steel should be inspected by the supervising engineer before concrete is placed. The bars must be clipped or wired together to prevent their displacement during placing and compacting of the concrete.

In normal practice, mild steel bars are used for reinforcing. For slab work, however, it will frequently be economical to use a light welded mesh.

A minimum cover of 3″ of concrete should be provided on all reinforcement on wall and column footings ; at surfaces of concrete exposed to the weather, cover should be not less than 1½″ of concrete. Where there is no exposure to weather or fire conditions a cover of ¾″ may be sufficient. Bars must always be secured in such a manner that the desired cover is maintained.

For information on areas, etc., of reinforcing steel, see MEMORANDA, Section 5.

11. PRECAST CONCRETE PRODUCTS.

Concrete can be adapted to a wide variety of precast products, viz.—pipes, blocks and bricks, fence posts, paving slabs, etc.

Certain of these products require the use of specialised equipment and technique. This applies particularly to reinforced concrete pipes, which are made by centrifugally spinning in a special machine. By this process a very high-class product is produced.

Many other concrete products such as bricks and blocks, curb and gutter units, fence posts, paving slabs etc. are more simply made, but a better product will result where attention is paid to mix design and curing, and where compaction is effected by a vibrating table.

Concrete building blocks are an excellent method of house construction, especially in districts remote from sources of clay-brick supply. A mix of 1 part cement : 5 parts coarse sand or 1 part cement : 2 parts sand : 4 parts coarse aggregate should be used for all blocks and bricks for external walls. Cinder or coke-breeze aggregates are satisfactory for internal walls above dampcourse level, but should never be used for blocks which may be exposed to moisture from any source. A wide variety of hand-machines for brick and block manufacture are available, the output per day varying from about 800 to 3,000 units.

As a basis for estimating cost, the following materials are required for 1,000 standard sized bricks or equivalent :—

Sand or combined coarse and fine aggregate, 2¼ cub. yards.
Cement, 10 to 12 bags depending on aggregate used.

This may be reduced to 8 bags in units for internal walls only.

Blocks or bricks must be thoroughly cured before using, and well dried-out when built into walls. Failure to observe these precautions will result in shrinkage cracking of the walls.

12. CONCRETE ROADS AND PAVEMENTS.

The thickness of any concrete pavement should be designed to take the wheel loads which it is likely to be called upon to carry, having regard to the subgrade condition at the particular site. This is a matter for a qualified engineer to determine.

Expansion joints must be provided to avoid random cracking. Such expansion joints should be formed with a filler which will permit free swelling and shrinkage of the slab sections, and must be sealed at the surface with a mastic to prevent the entry of surface water and solid matter into the joints. Many forms of expansion jointing are in use, but the perfect jointing has not yet been discovered.

Reinforcement in slabs may be in one or more of three forms :—

(a) Distributed reinforcement through the slab area. The main function of this is to prevent development of any incipient cracking. The modern tendency is to regard such distributed reinforcement as unnecessary in slabs placed on a well-prepared uniform subgrade, with suitably spaced joints. Where a poor subgrade exists for any reason, and cracks can be expected, a small amount of distributed reinforcement may be desirable.

(b) Edge and corner bars (marginal reinforcement) are frequently used, either on their own or in conjunction with distributed reinforcement. Modern thought is that this may also be discarded without any detriment to the pavement.

(c) Tie bars in longitudinal joints and dowel bars in transverse expansion joints are useful. Dowel lengths should not exceed 18″ and dowel spacing 12″.

Mechanised equipment is now commonly used for concrete roads, incorporating vibratory compaction and mechanical screeding and finishing.

Flexural strength of concrete for pavements is of greater importance than compressive strength. Specifications frequently require a flexural strength of 600 lbs. per square inch at 28-days ; in a well designed mix this will probably correspond to a 28-day compressive strength of 4,500 to 5,000 lbs. per square inch.

Concrete pavements should be protected from rapid surface evaporation conditions as early as possible after placing. This is best achieved by application of a bitumen emulsion compound. Alternatively, curing may be by ponding of water on the surface, covering with sand or earth and maintaining in a moist condition, or covering with a waterproof building paper. Good results can be achieved in the latter case only where joints between the rolls of building paper are adequately sealed.

MEMORANDA.

Section (1) Weights and Dimensions of Concrete and its Constituent Parts.

Cement: Paper bags contain 94 lbs. or 1 cu. ft.: 24 bags to 1 ton.
1 cu. ft. of Portland cement weighs 75 to 90 lbs. loosely filled.
1 cu. ft. of Portland cement weighs 110 lbs tightly packed.
A basis of 94 lbs. is used in converting cement from cu. ft. to lbs.
1 barrel of cement (e.g., White Portland cement) = 376 lbs.; 1 barrel = 4 paper bags; 6 barrels = 1 ton.

Water: 1 cu. ft. of fresh water = 62·4 lbs. = 6.24 gals; 1 gallon of water = 10 lbs. = 0·16 cu. ft.

Concrete: Average weights per cu. ft. of 1:2:4 concrete :—Coke-breeze coarse aggregate, 100 lbs.; clinker, 110 lbs.; brick, 125 lbs.; limestone, 135 lbs.; crushed metal or gravel, 145–150 lbs.; sawdust, 70 lbs.; wood-wool, 40–50 lbs. Average weight, 1:2:4 reinforced concrete, 150–155 lbs. per cu. ft.

Aggregate: 1 ton = 21 cu. ft. river sand, 22 cu. ft. pit sand, 23 cu. ft. coarse gravel, 24 cu. ft. broken stone.
Average weight per cubic yard (loose material): dry sand, 1·30 to 1·40 tons; moist sand, 1·05 to 1·35 tons; $\frac{3}{16}$ in. to $\frac{3}{4}$ in. screened gravel, 1·25 to 1·35 tons; $\frac{3}{4}$ in to $1\frac{1}{2}$ in. screened gravel, 1.25 to 1·35 tons; sand and gravel (combined) dry, 1·50 to 1·75 tons.
Weight per cu. yd. depends on contained moisture and on compaction.
Dry and saturated sands have essentially the same volume; a moisture content of 5 to 15 per cent. may increase the volume by as much as 40 per cent.

Section (2) Grading of Aggregates.

The following grading may be regarded as suitable for all general concrete work :—

(i) Coarse Aggregates:

Range of Sizes.	% Passing Sieve.			
	$1\frac{1}{2}$ in.	$\frac{3}{4}$ in.	$\frac{3}{8}$ in.	$\frac{3}{16}$ in.
$1\frac{1}{2}$ in. to $\frac{3}{16}$ in. ...	95–100	30–70	10–35	Not more than 5.
$\frac{3}{4}$ in. to $\frac{3}{16}$ in. ...	—	95–100	25–55	Not more than 10.
$\frac{1}{2}$ in. to $\frac{3}{16}$ in. ...	—	—	40–85	Not more than 10.

(ii) Fine Aggregates :

Natural Sands.			Crushed Stone.		
Sieve (B.S.S.)	% Passing.		Sieve (B.S.S.)	% Passing.	
	Lower Limit	Higher Limit		Lower Limit	Higher Limit
$\frac{3}{16}$" ...	95	100	$\frac{3}{16}$" ...	90	100
No. 7 ...	70	95	No. 7 ...	60	90
No. 14 ...	45	85	No. 14 ...	40	80
No. 25 ...	25	60	No. 25 ...	20	50
No. 52 ...	5	30	No. 52 ...	5	30
No. 100 ...	0	10	No. 100	0	15

(iii) " All-in " Crushed Stone :

Range of Sizes.	% Passing Sieve.			
	$1\frac{1}{2}$ in.	$\frac{3}{4}$ in.	$\frac{3}{16}$ in.	No. 100
$1\frac{1}{2}$ in. nominal ...	95–100	40–70	25–45	Not more than 6.
$\frac{3}{4}$ in. nominal ...	—	95–100	30–50	Not more than 6.

Section (3) Proportioning of Constituents and Yields.

(a) Dimensions of Measuring Boxes :—

	Capacity
12 in. x 12 in. x 12 in.	1 cubic ft.
15 in. x 15 in. x $11\frac{1}{2}$ in.	$1\frac{1}{2}$ cubic ft.
15 in. x 15 in. x $15\frac{3}{8}$ in.	2 cubic ft.
18 in. x 18 in. x $13\frac{3}{8}$ in.	$2\frac{1}{2}$ cubic ft.
18 in. x 18 in. x 16 in.	3 cubic ft.
18 in. x 18 in. x $21\frac{1}{2}$ in.	4 cubic ft.
30 in. x 30 in. x 26 in.	$\frac{1}{2}$ cubic yd.
36 in. x 36 in. x 36 in.	1 cubic yd.

(b) Proportions of Solids and Voids in Aggregates :—

Aggregates	Solids	Voids
Sand, moist, fine, passing 18–mesh sieve (i.e., 324 meshes to the sq. in.)	0·57	0·43
Sand, moist, coarse, not passing 18–mesh sieve ...	0·65	0·35
Sand, moist, coarse and fine mixed	0·62	0·38
Sand, dry, coarse and fine mixed	0·70	0·30
Stone screenings and stone dust	0·58	0·42
Ballast, $\frac{3}{4}$ in. and under, 6 per cent. coarse sand ...	0·67	0·33
Broken stone, 1 in. and under	0·54	0·46
Broken stone, $2\frac{1}{2}$ in. and under, dust only screened out	0·59	0·41
Broken stone, 2 in. and under, most small stones screened out	0·55	0·45

(c) **Mixes and material quantities for various jobs :—**

CLASS OF WORK.	Proportions of nominal mix (volumes)	Materials required to make 10 cubic yards of mixture.			Yield of mixture per paper bag of Cement (c. ft.)	Water in gals per bag of Cement
		Cement (paper bags)	Sand (c. yds.)	Metal or Gravel (c. yds.)		
Foundations for roads, machinery, buildings, etc., and for concrete in mass walls	1 : 3 : 6	41	4·6	9·1	6·60	6·9
High strength grout mixture	1 : 1	195	7·2	—	1·40	3·5
Watertight plaster coats for cellars, tanks, dairy walls, etc. Mortar for structural brickwork	1 : 2	128	9·5	—	2·10	4·2
Surface rendering for 2-course concrete paths. Grout for cement penetration roads, etc. ...	1 : 2½	110	10·1	—	2·45	4·5
Mortar for wall plaster, rough casting and stucco	1 : 3	96	10·6	—	2·80	4·9
Sand cement mixture for building blocks and bricks. Will not resist damp	1 : 5	63	11·7	—	4·3	6·2

(c) **Mixes and material quantities for various jobs (Continued) :—**

CLASS OF WORK.	Proportions of nominal mix (volumes)	Materials required to make 10 cubic yards of mixture.			Yield of mixture per paper bag of Cement (c. ft.)	Water in gals per bag of Cement
		Cement (paper bags)	Sand (c. yds.)	Metal or Gravel (c. yds.)		
Heavy-duty floor surfacings. Very thin slabs and slender columns where heavily reinforced ...	1 : 1 : 2	100	3·7	7·4	2·70	4
High structural strength concrete for thin reinforced walls, slender reinforced columns, fence posts, heavy-duty floors	1 : 1½ : 3	76	4·2	8·5	3·55	4·7
High strength concrete for heavily trafficked roads and heavy-duty floors ...	1 : 2 : 3½	65	4·8	8·5	4·20	5·2
Commonly adopted mixture for reinforced concrete beams and floor slabs, roads, foot-paths, etc., silos, etc.	1 : 2 : 4	60	4·4	8·9	4·50	5·4
For general structural purposes	1 : 2½ : 4	55	5·1	8·2	4·90	5·6
For strong foundations, lean mix roads ...	1 : 2½ : 5	49	4·5	9·1	5·50	6·1

(d) **Materials required for Concrete slabs, per 1,000 sq. ft. :—**

C = Cement in Bags of 1 Cu. Ft. Capacity.
FA = Fine Aggregate (Sand) in Cu. Ft.
CA = Coarse Aggregate (Pebbles or Broken Stone) in Cu. Ft.

Quantities may vary 10 per cent. either way according to aggregate used. No allowance made for waste.

	Proportions for Concrete.														
	1 : 1 : 1½			1 : 2 : 3			1 : 2 : 4			1 : 2½ : 4			1 : 2½ : 5		
	C	FA	CA	C	FA	CA	C	FA	CA	C	FA	CA	C	FA	CA
⅜	—	—	—												
½	18	18	27												
¾	27	27	41												
1	37	37	55												
1¼	46	46	68												
1½	55	55	82												
1¾	64	64	97												
2	73	73	111												
3	—	—	—	65	130	193	56	112	224	52	129	206	46	115	230
4	—	—	—	86	172	258	75	149	298	69	171	275	62	154	307
5	—	—	—	108	216	322	94	187	374	86	215	343	77	192	383
6	—	—	—	129	258	386	112	224	447	103	258	412	92	230	459
8	—	—	—	172	344	516	150	298	597	137	343	549	123	307	613
10	—	—	—	215	432	644	187	374	748	172	430	686	153	383	766
12	—	—	—	258	516	772	224	447	894	206	516	824	184	459	918

Cubic Feet per ton of various materials.

	c. ft.
1 ton river sand	21
1 ton Pit Sand	22
1 ton Coarse Gravel ...	23
1 ton ¾in. Blue Metal ...	24

Weight per cubic foot of 4 : 2 : 1 mix. concrete using various aggregates.

	lbs.
Coke breeze ...	60 to 100
Clinker	110
Brick	125
¾ Bluestone	144

If reinforced, add weight of metal built in.

1 gallon of water = ·16 c. ft. = 10 lbs. 1 cubic foot water = 6¼ gal. = 62·4 lbs.

MATERIALS REQUIRED FOR ONE CUBIC YARD OF CONCRETE.

Concrete Mixture Parts			Material for one cub. yd.		
Cement	Sand	Stone	Quantity Cement bags	Sand cubic feet	Stone cubic feet
1	1	2·0	10·1	10·5	21·06
1	1	2·5	9·2	9·45	23·63
1	1	3·0	8·3	8·37	25·38
1	1·5	2·5	8·3	12·69	21·06
1	1·5	3·0	7·4	11·34	22·68
1	1·5	4·0	6·3	9·72	25·92
1	2·0	3·0	6·8	14·04	20·79
1	2·0	3·5	6·3	12·96	22·41
1	2·0	4·0	5·8	11·88	23·76
1	2·0	4·5	5·5	11·34	25·11
1	2·5	4·5	5·7	12·96	23·63
1	2·5	5·0	4·8	12·42	24·57
1	2·5	5·5	4·5	11·61	25·38
1	3·0	4·5	4·8	14·58	21·87
1	3·0	5·0	4·5	13·77	22·95
1	3·0	5·5	4·3	12·96	23·76
1	3·0	6·0	4	12·42	24·84

NOTE.—One paper bag of Cement contains 1 cubic foot.
One kerosene Tin contains ·65 cubic feet or one half bushel.

Section (4) Physical Characteristics of Concrete.

(a) **Typical compressive strengths** of ordinary building concrete, 1 : 2 : 4 mix ; job cured under temperate climatic conditions :—

7 days old	2,200 lbs. per sq. in.
28 days old	3,000 ,, ,, ,, ,,
6 months old	3,600 ,, ,, ,, ,,
1 year old	3,800 ,, ,, ,, ,,

(b) Flexural strengths (of prime importance in concrete pavement design), cannot be safely estimated from compressive strengths, unless extensive tests are made with the particular concrete mix and conditions pertaining to an individual job. The flexural strength may vary, for different combinations of materials, from approx. 10 per cent. to 15 per cent. of the compressive strength.

28-day flexural strengths of typical high-class pavement mixes (6 bags of cement per cu. yd.) may lie within range 500-700 lbs. per sq. inch.

(c) Approx. Coefficients of Thermal Conductivity (k) :—

Type of Concrete.	B.Th.U./hour/sq. ft./in. thickness/°F.
Breeze	5·2
Cellular	0·7–2·0 (approx.)
Cinder	5·2
Clinker 1 : 6	2·8
,, 1 : 10	2·3
Cement/sand/stone, 1 : 2 : 4	7·0
" No-fines ", 8″ wall ...	U = 0·43–0·46
Vermiculite 1 : 3	1·1
1 : 6	0·65
1 : 8	0·57

(d) Coefficients of thermal expansion for average (approx. 6 bags cement per cu. yd.) mixes, with various aggregates :—

Concrete, average	·0000055	per	degree	Fahrenheit
,, basalts and gabbros	·0000030	,,	,,	,,
,, marbles	·0000039	,,	,,	,,
,, limestones	·0000044	,,	,,	,,
,, granites	·0000048	,,	,,	,,
,, sandstones	·0000056	,,	,,	,,
,, quartzites	·0000062	,,	,,	,,

(Coefficients for individual specimens may vary widely from these average values).

The average figure given is equivalent to 0·66 in. per 100 ft. for a temperature change of 100°F.

(e) Resistance to high Temperatures : Depends largely on time of exposure and type of aggregate, being lower for siliceous aggregates and higher for burned-clay, limestone, etc. For concrete of ordinary good-class aggregates, do not expose to temperatures above 500°F. for long periods.

(f) Expansion and Contraction due to Moisture Changes : Concrete expands with gain in moisture content, and contracts with loss of moisture. Usually the engineer is more interested in the shrinkage occurring during initial drying of the concrete.

Concrete is generally fully saturated until damp-curing is withdrawn, when drying takes place with accompanying shrinkage, rapidly at first and then more slowly for an indefinite period.

Amount of shrinkage increases with wetter consistencies, finer sands, and smaller coarse aggregates.

For design purposes an average factor of 0·0002 to 0·0003 can be assumed : this corresponds to a shrinkage of $\frac{1}{4}$″ to $\frac{3}{8}$″ in 100 feet length.

Section (5) Data on Steel Reinforcing Bars.

(i) Data for Steel Rods Reinforcement.

Diam. of Rods.	AREAS IN SQUARE INCHES OF A NUMBER OF ROUND RODS. Number of Rods.										
	1′0″	1	2	3	4	5	6	7	8	9	10
$\frac{1}{8}$	·041	·01227	·02454	·03681	·04908	·06135	·07362	·08559	·09816	·11043	·1227
$\frac{3}{16}$	·094	·02761	·05522	·08283	·11044	·13805	·16566	·19321	·22088	·24849	·2761
$\frac{1}{4}$	·167	·04908	·09816	·14724	·19632	·24540	·29448	·34356	·39264	·44172	·4908
$\frac{5}{16}$	·261	·07669	·15338	·23007	·30696	·38345	·46014	·53683	·61352	·69021	·7669
$\frac{3}{8}$	·376	·1104	·2208	·3312	·4416	·5520	·6624	·7728	·8832	·9936	1·104
$\frac{7}{16}$	·511	·1503	·3006	·4509	·6012	·7515	·9018	1·0521	1·2024	1·3527	1·503
$\frac{1}{2}$	·668	·1963	·3926	·5889	·7852	·9815	1·1778	1·3741	1·5704	1·7667	1·963
$\frac{9}{16}$	·845	·2485	·4970	·7455	·9940	1·2425	1·4901	1·7395	1·988	2·2365	2·485
$\frac{5}{8}$	1·044	·3067	·6134	·9201	1·2268	1·5335	1·8402	2·1469	2·4536	2·7603	3·067
$\frac{11}{16}$	1·263	·3712	·7424	1·1136	1·4848	1·8560	2·2272	2·5984	2·9696	3·3408	3·712
$\frac{3}{4}$	1·503	·4417	·8834	1·3251	1·7668	2·2085	2·6502	3·0919	3·5336	3·9753	4·417
$\frac{13}{16}$	1·764	·5184	1·0368	1·5552	2·0736	2·592	3·1104	3·6288	4·1472	4·6656	5·184
$\frac{7}{8}$	2·046	·6013	1·2026	1·8039	2·4052	3·0065	3·6078	4·209	4·8104	5·4117	6·013
$\frac{15}{16}$	2·349	·6902	1·3804	2·0706	2·7608	3·4510	4·1412	4·8314	5·5216	6·2118	6·902
1	2·673	·7854	1·5708	2·3562	3·1416	3·9270	4·7124	5·4978	6·2832	7·0686	7·854
$1\frac{1}{8}$	3·382	·9940	1·9880	2·982	3·976	4·97	5·964	6·958	7·952	8·946	9·940
$1\frac{1}{4}$	4·176	1·227	2·454	3·681	4·908	6·135	7·362	8·589	9·816	11·043	12·27
$1\frac{3}{8}$	5·053	1·484	2·968	4·452	5·936	7·420	8·904	10·388	11·872	13·356	14·84
$1\frac{1}{2}$	6·013	1·767	3·534	5·301	7·068	8·835	10·602	12·369	14·136	15·903	17·67

RODS FOR REINFORCING CONCRETE ii.

Diam. of Rods	PERIMETERS OF A NUMBER OF ROUND RODS. (*M. S. Stanley, A.M.I.E.Aust.*)									
	1 rod	2 rods	3 rods	4 rods	5 rods	6 rods	7 rods	8 rods	9 rods	10 rods
$\frac{1}{8}$	·3926	·7852	1·1778	1·5704	1·963	2·3556	2·7482	3·1408	3·5334	3·92
$\frac{3}{16}$	·589	1·178	1·767	2·356	2·945	3·534	4·123	4·712	5·301	5·896
$\frac{1}{4}$	·7854	1·5708	2·3562	3·1416	3·927	4·7124	5·4978	6·2832	7·0686	7·854
$\frac{5}{16}$	·9817	1·9634	2·9451	3·9268	4·9085	5·8902	6·8719	7·8536	8·8353	9·817
$\frac{3}{8}$	1·178	2·356	3·534	4·712	5·89	7·068	8·246	9·424	10·602	11·78
$\frac{7}{16}$	1·374	2·748	4·122	5·496	6·87	8·244	9·618	10·992	12·366	13·74
$\frac{1}{2}$	1·57	3·14	4·71	6·28	7·85	9·42	10·99	12·56	14·13	15·7
$\frac{9}{16}$	1·767	3·534	5·301	7·068	8·835	10·602	12·369	14·136	15·903	17·67
$\frac{5}{8}$	1·963	3·926	5·889	7·852	9·815	11·778	13·741	15·704	17·667	19·63
$\frac{11}{16}$	2·159	4·318	6·477	8·636	10·795	12·954	15·113	17·272	19·431	21·59
$\frac{3}{4}$	2·356	4·712	7·068	9·424	11·78	14·136	16·492	18·848	21·204	23·56
$\frac{13}{16}$	2·552	5·104	7·656	10·208	12·76	15·312	17·864	20·416	22·968	25·52
$\frac{7}{8}$	2·748	5·496	8·244	10·992	13·74	16·488	19·236	21·984	24·732	27·48
$\frac{15}{16}$	2·945	5·89	8·835	11·78	14·725	17·67	20·615	23·56	26·505	29·45
1	3·141	6·282	9·423	12·564	15·705	18·846	21·987	25·128	28·269	31·41
$1\frac{1}{16}$	3·3392	6·678	10·017	13·357	16·696	20·035	23·3744	26·7136	30·0528	33·392
$1\frac{1}{8}$	3·534	7·068	10·602	14·136	17·67	21·204	24·738	28·272	31·806	35·34
$1\frac{3}{16}$	3·7321	7·464	11·196	14·928	18·661	22·393	26·1347	29·8568	33·5889	37·321
$1\frac{1}{4}$	3·927	7·854	11·781	15·708	19·635	23·562	27·489	31·416	35·343	39·27
$1\frac{5}{16}$	4·125	8·25	12·375	16·5	20·625	24·75	28·875	33·	37·125	41·25
$1\frac{3}{8}$	4·319	8·638	12·957	17·276	21·695	25·914	30·233	34·552	38·871	43·19

The above table is read vertically and horizontally and gives the circumference of any number of rods from $\frac{1}{8}$in. to $1\frac{3}{8}$ in. Thus, ten 1 in. rods have a total circumference or perimeter equal to 31.41 inches.

Dia. of Rod.	Area of Steel per foot width of slab using Round Rods of varying pitches.																		
	Area	1½″	1⅝″	2″	2¼″	2½″	2⅝″	3″	3¼″	3½″	3¾″	4″	4¼″	4½″	4⅝″	5″	5¼″	5½″	5⅝″	6″
⅛	·01227	·098	·084	·074	·065	·059	·054	·049	·045	·042	·039	·037	·035	·033	·030	·030	·028	·026	·025	·024
3/16	·02761	·221	·189	·166	·147	·133	·121	·110	·102	·095	·088	·083	·078	·074	·070	·066	·063	·060	·058	·055
¼	·0491	·393	·337	·295	·212	·236	·214	·196	·181	·169	·157	·147	·139	·131	·124	·118	·112	·107	·103	·098
5/16	·0767	·614	·526	·460	·409	·368	·335	·307	·283	·263	·245	·23	·217	·205	·194	·184	·175	·167	·160	·153
⅜	·1104	·883	·757	·662	·589	·53	·481	·442	·408	·379	·353	·331	·312	·294	·279	·265	·252	·241	·231	·221
7/16	·1503	1·202	1·030	·902	·802	·721	·656	·601	·555	·515	·481	·451	·424	·401	·38	·361	·344	·328	·314	·301
½	·1963	1·570	1·332	1·178	1·047	·942	·857	·785	·725	·666	·628	·589	·554	·523	·496	·471	·444	·428	·410	·393
9/16	·2485	1·988	1·704	1·491	1·325	1·193	1·084	·994	·918	·852	·795	·746	·702	·663	·628	·596	·568	·542	·520	·497
⅝	·3067	2·454	2·103	1·84	1·636	1·472	1·338	1·227	1·132	1·052	·981	·920	·866	·818	·773	·736	·701	·669	·641	·613
¾								1·485	1·371	1·273	1·188	1·110	1·042	·990	·925	·891	·849	·809	·776	·742
⅞								1·767	1·631	1·514	1·413	1·325	1·247	1·178	1·12	1·060	1·009	·964	·924	·883
1												1·555	1·464	1·832	1·31	1·244	1·185	1·13	1·083	1·037
1⅛												1·804	1·698	1·603	1·52	1·443	1·374	1·312	1·257	1·203

DATA FOR STEEL REINFORCEMENTS.

Dia. of Rods.	Weight in Pounds of Round Mild Steel Rods.														
	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′
⅛	·041	·082	·123	·164	·205	·246	·287	·328	·369	·41	·451	·492	·533	·574	·615
3/16	·094	·188	·282	·376	·47	·654	·658	·752	·846	·94	·1034	1·128	1·222	1·316	1·41
¼	·167	·334	·501	·668	·835	1·002	1·169	1·336	1·503	1·67	1·837	2·004	2·171	2·338	2·505
5/16	·261	·522	·783	1·044	1·305	1·566	1·827	2·088	2·349	2·61	2·871	3·132	3·393	3·654	3·915
⅜	·376	·752	1·128	1·504	1·88	2·256	2·632	3·008	3·384	3·76	4·136	4·512	4·888	5·264	5·64
7/16	·511	1·022	1·533	2·044	2·555	3·066	3·577	4·088	4·599	5·11	5·621	6·132	6·643	7·154	7·665
½	·668	1·336	2·004	2·672	3·34	4·008	4·676	5·344	6·012	6·68	7·348	8·016	8·684	9·352	10·02
9/16	·845	1·69	2·535	3·38	4·225	5·07	5·915	6·76	7·605	8·45	9·295	10·14	10·985	11·83	12·675
⅝	1·044	2·088	3·132	4·176	5·22	6·264	7·308	8·352	9·396	10·44	11·484	12·528	13·572	14·616	15·66
11/16	1·263	2·526	3·789	5·052	6·315	7·578	8·841	10·104	11·367	12·63	13·893	15·156	16·319	17·582	18·845
¾	1·503	3·006	4·509	6·012	7·515	9·018	10·521	12·024	13·527	15·03	16·533	18·036	19·539	21·042	22·545
13/16	1·764	3·528	5·292	7·056	8·82	10·584	12·348	14·112	15·876	17·64	19·404	21·168	22·932	24·696	26·46
⅞	2·046	4·092	6·138	8·184	10·23	12·276	14·322	16·368	18·114	20·46	22·506	24·552	26·598	28·644	30·69
15/16	2·349	4·698	7·047	9·396	11·745	14·094	16·443	18·792	21·141	23·49	25·839	28·188	30·537	32·886	35·235
1	2·673	5·346	8·019	10·692	13·365	16·038	18·711	21·384	24·057	26·73	29·403	32·076	34·749	37·422	40·095
1⅛	3·382	6·764	10·146	13·528	16·81	20·292	23·674	27·056	30·438	33·82	37·202	40·584	43·966	47·348	50·73
1¼	4·176	8·352	12·528	16·704	20·88	25·056	29·232	33·408	37·584	41·76	45·936	50·112	54·288	58·464	62·64
1⅜	5·053	10·106	15·159	20·212	25·265	30·318	35·371	40·424	45·477	50·53	55·583	60·636	65·689	70·742	75·795
1½	6·013	12·026	18·039	24·052	30·065	36·078	42·091	48·104	54·117	60·13	66·143	72·156	78·169	84·182	90·195

DATA FOR REINFORCED COLUMNS. *M. S. Stanley, A.M.I.E.,* (*Concrete Engineer*).

CIRCULAR COLUMNS.					HEXAGON COLUMNS.				
Diam. in Inches	Area in Square ins.	Perimeter in inches	Weight in pounds per lin. foot	Volume in cubic ft. per lineal ft.	Min. Dia. in Inches	Area in square ins.	Perimeter in inches	Weight in pounds per lin. foot	Volume in cubic ft. per lineal ft.
12	113·1	37·70	117·8	·78	12	119·3	39·76	124·3	·83
13	132·7	40·84	138·2	·92	13	140·0	43·08	145·8	·97
14	153·9	43·98	160·3	1·07	14	162·4	46·39	169·2	1·12
15	176·7	47·12	184·1	1·22	15	186·4	49·7	194·2	1·29
16	201·1	50·27	209·5	1·40	16	212·1	53·02	220·9	1·47
17	227·0	53·41	236·5	1·57	17	239·4	56·33	249·4	1·66
18	254·5	56·55	265·1	1·77	18	268·4	59·65	279·6	1·86
19	283·5	59·69	295·3	1·97	19	299·1	62·99	311·6	2·08
20	314·2	62·83	327·3	2·18	20	331·4	66·27	345·2	2·30
21	346·4	65·97	360·8	2·40	21	365·3	69·59	380·5	2·53
22	380·1	69·12	395·9	2·64	22	401·0	72·9	417·7	2·78
23	415·4	72·26	432·8	2·88	23	438·2	76·21	456·5	3·04
24	452·4	75·4	471·2	3·14	24	477·2	79·52	479·1	3·31
25	490·9	78·54	511·4	3·41	25	517·8	82·84	539·4	3·59
26	530·9	81·68	553·0	3·69	26	560·0	86·16	583·3	3·89
27	572·6	84·82	596·5	3·97	27	603·9	89·47	629·1	4·19
28	615·8	87·96	641·5	4·27	28	649·5	92·78	676·6	4·51
29	660·5	91·11	688·0	4·59	29	696·7	96·10	725·7	4·84
30	706·9	94·25	736·3	4·91	30	745·6	99·41	776·7	5·17
31	754·8	97·39	786·2	5·24	31	796·1	102·72	829·3	5·52
32	804·2	100·53	837·7	5·58	32	848·3	106·04	883·6	5·89
33	855·3	103·67	890·9	5·94	33	902·2	109·35	939·8	6·26
34	907·9	106·81	945·7	6·30	34	957·7	112·66	997·6	6·64
35	962·1	109·96	1002·2	6·68	35	1014·8	115·98	1057·1	7·04
36	1017·9	113·10	1060·3	7·06	36	1073·6	119·29	1118·3	7·45
37	1075·2	116·24	1120·0	7·47	37	1134·1	122·61	1181·3	7·87
38	1134·1	119·38	1181·3	7·87	38	1196·3	125·92	1246·1	8·30
39	1194·6	122·52	1244·4	8·29	39	1260·0	129·23	1312·5	8·74
40	1256·6	125·66	1308·9	8·72	40	1325·5	132·55	1380·7	9·20

Section 6. Effect of Various Substances on Concrete.

Agent	Effect on Concrete
Acids :	
Hydrochloric, hydro-fluoric, muriatic, nitric, sulphurous, sulphuric ...	Disintegrates.
Acetic, carbolic, carbonic, lactic phosphoric, tannic	Disintegrates slowly.
Humic, natural acid waters	Disintegrates surface.
Salts and Alkalies :	
Carbonates of ammonia, sodium, potassium	None.
Chlorides of calcium, potassium, sodium	None, unless wet and dry alternately.
Chlorides of ammonia, copper, iron, zinc, mercury, magnesium ...	Disintegrates slowly.
Fluorides	None (except ammonium).
Hydroxides of ammonia, calcium, potassium, sodium	None.
Nitrates of ammonia	Disintegrates.
Nitrates of calcium, postassium, sodium	None.
Potassium permanganate	None.
Silicates	None.
Sulphates of ammonia, aluminium, calcium, copper, etc.	Disintegrates.
Petroleum Oils :	
Heavy oils, below 35° Baume	None.
Light oils, above 35° Baume	None } require highly im-
Benzine, Kerosene, Naphtha, etc. ...	None } pervious surface.
Coal Tar Distillates :	
Benzol, paraffin, pitch, toluol ...	None.
Creosote, Phenol	Disintegrates slowly.
Vegetable Oils :	
Resin, turpentine	None.
Castor, chinawood, coconut, linseed, olive, peanut, tung, soybean ...	Disintegrates surface slowly.
Fats and Fatty Acids :	
Fish oil	Slight attack.
Lard and tallow	Disintegrates surface slowly.
Miscellaneous :	
Bleaching solution	Usually no effect.
Borax, boric or boracic acids	None.
Brine	None, unless wet and dry alternately.
Charged water (same as carbonic acid)	Disintegrates slowly.
Caustic soda	None.
Cinders	May cause disintegration.
Coal (unless high in pyrites and moisture)	None.

Effect af Various Substances on Concrete.

Electrolyte for—	
Lead and zinc refining and chrome plating	... Disintegrates.
Nickel and copper plating	... None.
Formalin (aqueous solution)	... Disintegrates
Fruit juices	... Slight attack.
Glucose	... Disintegrates slowly.
Glycerine	... Disintegrates slowly.
Lye	... May be slight attack.
Milk (if sour only)	... Disintegrates.
Molasses	... May be slight attack.
Silage	... Disintegrates slowly.
Sugar (in solution only) ...	... Disintegrates.
Tanning liquor (if acid only)	... Disintegrates slowly.
Vinegar (as acetic acid) ...	... Disintegrates slowly.
Washing soda	... None.
Whey (as lactic acid)	... Disintegrates slowly.
Wine	... None; but desirable to treat surface initially with tartaric acid solution (1 lb. to 3 pints water) or sodium silicate.

7. COLOURING OF CONCRETE.

Colour pigments for use with cement must be very finely ground, insoluble in water, uniform in shade and quality, and proof against lime, alkali, and action of direct sunlight.

The most suitable pigments are metallic oxides of a high degree of purity.

A pure white is obtained only by use of white Portland cement with white sand, crushed marble, etc.

Pigment and cement should be ground together; or, sieved together to a uniform colour throughout.

A steel trowel gives a darker colour than a wooden float.

Concrete cured in sunlight will give a lighter colour than if cured in shade.

Coloured concrete is darker when wet than when dry.

Trowelling on partly hardened surfaces causes colour blotches.

The amount of pigment varies from about 5 to 12 lbs. per bag of cement.

Use of the following pigments is recommended :—

Red, Iron Oxide; **Yellow,** Iron Oxide or Hydroxide; **Brown,** Iron Oxide; **Black,** Iron Oxide or manganese dioxide (lamp black should NOT be used); **Green,** Chromium Oxide; **Blue,** Cobalt Oxide.

Pigments may be mixed to give other effects as desired.

8. CEMENT RENDERING.

Cement rendering or plastering is used for facing external and/or internal walls of brickwork, masonry, concrete, etc. A wide range of surface finishes can be achieved, varying from a smooth trowelled surface through sand textures to a variety of textured finishes.

Surfaces to be rendered must be in proper condition to provide a good bond for the plaster and to provide some support whilst the mixture is still plastic. Smooth surfaces may require to be roughened, or a spatterdash coat initially applied. Rendering may also be applied over heavy-gauge wire netting, expanded metal, patent lathing, etc., such materials being firmly secured with a backing of building paper or similar material.

Mortar mixes should be about 1 part cement : 3 parts sand. A richer mix may be used for waterproof rendering, but over-rich mixes are likely to result in crazing. Hydrated lime (up to 10 lbs. per bag of cement) may be added to improve plasticity. For rendering over lathing, etc., a very plastic mix, preferably containing 1 lb. of hair per cubic foot of mix, should be used for the backing coat.

For data on proportions and quantities of mortars and covering power see MEMORANDA, Section 3 (d) and (e).

For Cement and Concrete problems—
SEE ADVERTISEMENT, PAGE 19.

CEMENT GUN PROCESS " GUNITE ".

The Cement Gun Process of pneumatic placing of concrete materials has been steadily increasing its application in industry over a considerable number of years, and is, in modern practice, applied to a wide variety of different types of work.

" Gunite " is a registered Trade Name of an aggregate and cement mixture shot into place by the Cement Gun process. This process results in a surface of high density and strength.

" Gunite " is produced by uniting dry aggregate and cement under air pressure at the nozzle of the Cement Gun, with a correct quantity of water added, the resulting mix being projected into place at a high velocity. Material deposited in this way hardens quickly, can be built up to considerable thickness without slumping, and becomes integral with the surface encased.

It is widely used throughout England and America, and gives structural strength and protection to a wide variety of engineering and architectural projects.

Specifications.

Adhesion—Experiments and actual use have shown that " Gunite " is actually stronger than the brick, stone or concrete against which it is applied.

Density—Tests of reservoirs and similar structures lined with "Gunite" prove that unequalled density and impervious ness to water are obtainable by the Cement Gun process. $\frac{5}{8}$" to $1\frac{1}{2}$" " Gunite " slabs, for example, showed no sign of leakage when tested at 700′ to 1,600′ head of water for several hours.

Strength—The Cement Gun process of applying " Gunite " results in material having a proven ultimate strength of 6,000 lbs. per square inch.

Expansion—The expansion of "Gunite" is almost identical with that of low carbon steel, which accounts for the flexibility and almost entire absence of cracking.

Operation of the Cement Gun.

The Equipment necessary for the process consists of a Compressor and Cement Gun, together with the necessary hoses, nozzles etc.

The cement and aggregates are mixed dry and placed in the Gun which consists of a two-chambered pressure vessel with cone valves, to give a continuous operation.

A mechanically operated feed wheel in the lower chamber feeds the dry materials into an air stream from the Compressor, whence they are carried along through a rubber hose and discharged at high speed through a specially designed nozzle.

Water at a pressure of 10 to 15 lbs. per square inch in excess of the air pressure at the nozzle is required, this being added to the mixed materials in the form of a spray.

This method of placing materials has some particular advantages, namely :—

1. The amount of water used can be adjusted to just sufficient to hydrate the cementing material, thus greatly improving the density of the product.
2. Impingement of the materials at high speed against the surface ensures intimate contact between new materials and the existing surface, and produces better bonding than that obtainable by any other method.
3. Graded materials are used and the high speed placing ensures an intensely hard, strong and dense product, with no risk of voids. In addition, particles of aggregate which do not pack densely into the "Gunite" appear as rebound, thus producing an automatic improvement in grading. A pecularity of the process is that no cement is evident in the rebound material.
4. Practically no form work is required for the process.

The "Gunite" immediately after depositing, is comparatively hard, and care should be taken to prevent any displacement of the materials by screeding or floating. Excrescences on the surface are cut off by means of a sharp-edged screed or float.

Thicknesses of up to two inches are placed in one layer on vertical and overhead surfaces and additional thicknesses are built up in successive layers.

"Gunite" for Repairs to Concrete.

There are several important points to be observed when applying "Gunite" for repair to ferro-concrete members.

Firstly, the whole of the loose concrete should be removed and any corrosion on the steel chipped away. All surfaces to be covered require roughening to provide a key for the "Gunite" and this is best done by pneumatic tools fitted with flat rose bits.

A layer of light mat reinforcement (usually 4″ x 4″ x 8gge) is securely fixed and "Gunite" is placed to a nominal thickness of two inches.

In all cases where deterioration has taken place on one side or corner of a beam or stanchion, the repair should, if possible, extend

around all sides of the member, in order to maintain continuity of lateral strength. This is important as a beam or stanchion repaired in this way can carry a considerable load with safety, even if the materials in the centre of the member are of poor quality.

Steel Protection.

Encasement of steel subject to corrosion provides for permanent structural strength and good protection against damage by fire. This is applied to steelwork in building construction, bridges, underground steel pipes, etc., and has particular importance where steel is subject to water spray or located in a corrosive atmosphere.

Linings.

Leaking reservoirs and tanks are repaired by means of a reinforced " Gunite " shell placed against the existing surface to provide a layer of impervious material bonded to the existing structure. Provided the tank or reservoir is structurally sound this will provide a permanent repair.

" Gunite " linings of bins and bunkers provide lasting resistance to abrasion, and are extensively used for coke and coal bins.

Linings of large sewers and pipelines provide resistance to internal corrosion, and are usually carried out in situ.

Water channels, etc., are economically lined by placing of a layer of " Gunite " directly against the excavated surface. Where any appreciable temperature variations occur, a layer of light mat reinforcement is recommended.

The excavated rock surface of tunnels, etc., subject to fretting, are economically treated by means of a thin coating of " Gunite" shot against and bonded to the rock surface. " Gunite " is extensively used in this way in underground coal mines where it has the additional advantages of protection against fire, the improvement of air ventilation and visibility and the reduction of roof fall hazards.

Chimney Stacks.

Refractory " Gunite " linings of steel chimney stacks provide protection to the internal steel surface against a corrosive attack, originating from condensation in the exhaust gases. This becomes particularly important where fuels with high moisture content are used.

An interesting development of " Gunite " is the construction of a complete self-supporting stack around old burnt-out steel stacks, which construction can be carried out without putting the old stack out of operation.

Other Applications of " Gunite ".

Grouting stone embankments and walls: Placing of Refractory materials.

Building construction—construction of thin concrete sections can be economically carried out in " Gunite " because of almost entire elimination of costly formwork.

Construction of swimming pools.

Encasement of timber piles as protection against marine borer attack.

A Company operates in Australia as Contractors for " Gunite " work and as selling Agents for Cement Guns.

See Advertisement Page 44b.

COVERING POWER OF 1 BAG OF PORTLAND CEMENT.

1 paper bag of cement = 94 lbs. = 1 cubic ft. = 24 to ton.

Portland Cement	Sand bags	Mixed = about c. feet.	cover 1 inch thick
1¼ paper bags	2	= 3·40	= 26 s. ft.
1⅓ ,,	3	= 4·50	= 36 s. ft.
1½ ,,	4	= 5·60	= 47 s. ft.

1 to 4 mixture when used as brick mortar will (with a joint of ⅜in.) lay 144 bricks.

COMPARISON OF SOLID MEASUREMENTS.

1 bushel = 1.28 c. ft. or 4 pecks or 8 gallons = 2 of 4 gal. kerosene tins.

∴ 21·1 bushels = 27 cubic feet or 1 cubic yard.

1 paper bag cement contains 1 c. ft. = 94 lbs., 4 gal. water per c. yd.

1 cubic foot of cement when mixed with aggregates, sand and stone.

proportion	cub. ft.
1 : 2 : 4	4·1
1 : 2½ : 5	5
1 : 3 : 6	5·8
1 : 4 : 8	7·5

Shrinkage of concrete, 4 : 2 : 1 mix.

One cubic yard material for concrete before mixing in loose, shrinks when set in the proportion of 14 to 9.

8 lbs. cement mortar will point one square yard of brickwork with ¼ inch joints.

Covering Power of One Cubic Yard Concrete or Mortar in Position.

AT A GLANCE.

ONE CUBIC YARD OF MIXED MORTAR, CEMENT OR OTHERWISE

Will	cover	36	square	yards	1	inch	thick	
,,	,,	18	,,	,,	2	,,	,,	
,,	,,	15	,,	,,	2½	,,	,,	
,,	,,	12	,,	,,	3	,,	,,	
,,	,,	9	,,	,,	4	,,	,,	say slabs and road gutters
,,	,,	7·2	,,	,,	5	,,	,,	say concrete floors
,,	,,	6	,,	,,	6	,,	,,	
,,	,,	5½	,,	,,	7	,,	,,	
,,	,,	4½	,,	,,	8	,,	,,	
,,	,,	4	,,	,,	9	,,	,,	say concrete roads or
,,	,,	3⅗	,,	,,	10	,,	,,	concrete walls
,,	,,	3	,,	,,	12	,,	,,	
,,	,,	2⅗	,,	,,	15	,,	,,	
,,	,,	2	,,	,,	18	,,	,,	

TABLE SHOWING QUANTITY OF MIXING WATER PER BAG OF CEMENT AND MATERIALS FOR ONE CUBIC YARD OF CONCRETE.

Based on use of Broken Stone One Inch and Under with Dust Screened Out.

QUANTITY OF MIXING WATER PER BAG OF CEMENT					MATERIALS FOR 1 CUBIC YARD OF CONCRETE			Quantity of Mixing Water per Cubic Yard Batch	
Approximate Mix			Imp. Galls. of Water per Paper Bag of Cement		Bags of Cement in 1 Cub. Yd. of Concrete	Cu. Ft. of Sand or Fine Aggregate in 1 Cubic Yard of Concrete	Cu. Ft. of Coarse Material (Broken Stone) in 1 Cu. Yd. of Concrete	Imp. Galls.	Imp. Galls.
Cement	Fine Aggregate (Sand)	Coarse Aggregate (Broken Stone or Gravel).	Min.	Max.	Paper Bags			Min.	Max.
1	1½	3	4½	5	7⅜	11⅜	22⅝	33⅛	36⅞
1	2	3	4⅜	5¼	6⅜	14	20¾	32⅛	35½
1	2	3½	4⅞	5⅜	6½	12⅞	22⅛	31⅝	35
1	2	4	5	5½	5⅞	11⅞	24	29⅜	32¼
1	2	5	5¾	6¼	5	10½	26¼	28¾	31¼
1	2½	3½	5	5½	6	14	19¾	30	33
1	2½	4	5¼	5¾	5⅜	14	22⅛	30⅝	34¾
1	2½	5	6	6½	4¾	12⅜	24½	28½	30⅞
1	3	4	5⅞	6⅜	5	15⅝	20¾	29¼	31⅞
1	3	5	6¼	6¾	4½	13⅜	23	28⅛	30⅜
1	3	6	6⅞	7¼	4	12⅜	24⅞	27½	29

READY MIXED CONCRETE.

The use of Ready Mixed Concrete in concrete work of all kinds is becoming increasingly popular as it has many advantages over job mixed concrete for jobs both large and small. In jobs on congested sites, it avoids the necessity for stock piling of coarse aggregates and sand and storing of cement on the site, thereby allowing valuable space for other work to proceed unimpeded. On small jobs, ready mixed concrete obviates the need for batching and mixing equipment for a relatively small yardage of concrete, and, from an economical standpoint, a great saving of time and labour.

Manufactured under ideal factory conditions, with laboratory supervision, ready mixed concrete is produced (to meet Australian Standard Specification No. (E) A.502–1941 or any other desired specification submitted by the client), with great uniformity both in material proportions and slump.

The ready mixed concrete plant consists of a set of large elevated bins for the storage of sand, coarse aggregates, etc., and a cement silo, in conjunction with which are arranged two weighing hoppers fitted with large " easy to read " dial scales—one for combined aggregates, the other for cement. All ingredients are added simultaneously to the mixer where they are mixed for the requisite period and the slump adjusted, then the concrete is discharged into the truck agitator drum.

The mix is transported in water-tight rotating drums to the job site—the time permitted by the Standards Association of Australia for this operation is one hour fifteen minutes, during which time it has been found concrete suffers no loss in ultimate strength whatever.

A close contact between job and factory must be maintained during pouring to control the quantity and rate of delivery of concrete. An accurate estimate should be made, in advance, of the quantity required for each pour, otherwise a surplus or deficiency may occur. The factory co-operates in this respect.

An essential part of the modern ready mixed concrete plant is the laboratory supervised by qualified chemists where exhaustive tests are continually carried out on raw materials, and the finished products. It is here that individual specifications for concrete are carefully analysed, preliminary trial batches made up and mix designs prepared before actual deliveries of concrete to a job are commenced.

AIR-ENTRAINED CONCRETE.

Air-Entrained Concrete is a most recent development in ready mixed concrete production. Special ingredients are added to mix whilst in the mixer, causing air to be entrained in the concrete. This reduces " bleeding " to a minimum, and, where surfaces have to be " finished ", it aids trowelling, floating or screeding to a smooth finish. No extra charge is made for this service.

PROPORTIONS OF MIXES AND USES.

The proportions of mixes are given in the order of metal, sand and cement. The most popular mix is 4 : 2 : 1. This is a mix of excellent strength and is used for general purposes, cottage foundations, etc.

Cottage Foundations : 4–2–1 ; 5–2–1 ; 5–2½–1 ; 5–3–1.
Foot Paths, Light Traffic, House Pathways : 5–2½–1.
Foundations Carrying Heavy Loads—Heavy Traffic : 3–2–1.
Bulky Retaining Walls : 6–3–1.
Dwarf Walls and Filling : 7–3–1.

For current prices and advice See Advertisement Page 24.

COSTS

The following costs of ready mixed concrete are approximate costs and do not represent the costs of any particular factory, and are inserted as a guide to tendering and proximate costing for architects and contractors. It is advisable always to contact the factory for current prices and advice.

APPROXIMATE COST—PER CUBIC YARD.

Cartage Distance 2 miles included.

Mix	2–1–1 :	3–1½–1 :	3–2–1 :	3½–2–1 :	4–2–1 :	4–2½–1 :	5–2–1
Cost	109/–	104/–	99/–	97/–	95/–	94/–	93/–
Mix	5–2½–1 :	5–3–1 :	6–3–1 :	7–3–1			
Cost	92/–	90/–	89/–	88/–			

Distances over 2 miles add 9d. per mile.

For Current Prices See Advertisement Page 24.

FORMWORK.

Formwork must be of sufficient strength and rigidity to carry the required weight without excessive deflection, and sufficiently "tight" to prevent loss of cement paste from the concrete.

The cost of formwork constitutes a heavy charge in all reinforced concrete works; this cost can, however, be cheapened by close study of the plans and careful forethought before beginning fabrication of forms. Formwork units must be fabricated to enable their continued re-use with a minimum of alteration. Timber units should be so held in place with a minimum of nails. Nails, where necessary, should not be driven home to permit of salvage of the timber for re-use.

Formwork for vertical faces is generally held in place by tie-rods and quick-release clamps, etc.; all toms, struts, etc., should be held by "fox" wedges to permit their easy release. The design of shuttering for beam and slab floors should be arranged that the slab forms may be removed first and sides of beams next, leaving shuttering under beam soffits for a longer period as necessary.

All shuttering should be oiled or lime-washed to prevent adhesion of concrete. It should be scraped and oiled and placed in racks ready for further use.

Under normal-temperature atmospheric conditions, forms should be stripped from concrete (with normal portland cement) not earlier than the following times:—

Vertical surfaces	3 days
Beam and slab soffits, less than 6 ft. span	10 days
Beam and slab soffits, spans greater than 6 ft.	14 days

Longer times are necessary when the temperature is below 50°F. for an appreciable part of the total period.

Steel formwork in standard-sized units can be hired, and may prove economical when forming large, unbroken surfaces.

For forming high structures of simple geometric form (in plan), with few irregularities, considerable economy may be effected by the use of sliding forms. Such forms are standard practice for the construction of reinforced concrete storage silos, chimney stacks, etc.

Bevelled strips are used to finish beam and column corners; where a very good surface finish is required, forms may be lined with sheet metal, plywood, hard building board, building paper, etc. Such linings may eliminate the necessity for later surface rendering, and avoid the cleaning off of slurry spillings from the floors below.

REINFORCED CONCRETE

FORMWORK—TIMBER.

COST OF FORMWORK—LABOUR ONLY.

The cost of erecting and removal of formwork incurred in an actual job, which included concrete floors, girders, lintel beams, stanchions, encasing steel joists, etc., amounted to £4 5s. 0d. per square. This amount was a labour only cost and represented the lumping together of all formwork as a single factor. Where the contractor has a stock of timber used for shuttering this cost labour only may be used, while allowing a percentage deterioration of material.

FORMWORK—LABOUR ONLY.

Approximate Costs—Erection and Removal.

For concrete jobs of considerable size, which includes floors, lintel beams, columns, encasing R.S. Joists and stanchions the forms, shuttering, etc., may be lumped together as one item and allowed for at approximately £4 10s. 0d. per square for the labour only.

Labour only forming to plain surfaces ... 6/– to 7/– per sq. yard
Labour only forming to beams and columns ... 8/– to 9/– per sq. yard
Labour stripping and cleaning forms ... ... 3/– to 4/– per sq. yard

Suspended Floors and Slabs.

In estimating the costs of formwork three uses of timber has been taken as a basis for costing. With care, more uses may be obtained, but this is offset by the deterioration and wastage in recutting, etc. Sometimes in two storey buildings the flooring for the ground floor is used for the concrete forming first, and then laid as a floor. For this reason costs are kept separate so that they may be deducted if necessary.

Example No. 1—per square and per square yd.—10 feet between floors.

	£	s.	d.
4 x 1 T. & G. Cypress Pine, 125 super feet at 120/– per 100	7	10	0
4 x 2 H.W. Joists ... 6/10′ = 40 sup. ft.			
4 x 3 ,, Bearers 3/10′ = 30 ,,			
4 x 3 ,, Toms 9/10′ = 90 ,,			
6 x 2 ,, Sole plates 9/2′ = 18 ,,			
178 sup. ft. at 84/3 per 100	6	12	6
4 x 1 Braces = 12 ft. super at 86/9 per 100		10	6
Add freight surcharge, 190 sup. ft. at 8/–		15	6
Wedges		4	0
Cartage —Softwood, 125 sq. ft. at 1/3 per 100 sq. ft. ...		1	7
Hardwood, 190 sq. ft. at 2/6 per 100 sq. ft. ...		4	9
Prime cost of material per square	£15	18	10
Material divided by 3 uses per square	£5	6	4
Preparation, erection and removal for first use	£3	10	0

Cost = 15/10 per sq. yard. Cost per square = £8 16s. 2d.
For each foot increase in height add 8/6 per square or 1/– per sq. yard.

These examples are approximate only and contractors must use their own judgment in the use of timbers, sizes, length of life, etc.

FORMWORK—WALLS

Example of Cost No. 2—per square double sided.

For formwork to walling 6″ thick and 10 feet high. Timber allowed to cover both sides of wall.

	£	s.	d.
6 x 1½ Oregon S.M. D.A.R. 42/10′ = 315 sup. ft. at 140/3 per 100 sup. ft.	22	1	9
6 x 2 H.W. Studding 14/10′ = 140 sup. ft. at 84/3 per 100 sup. ft.	5	18	0
4 x 4 H.W. Bearers, 4/10′ = 54 sup. ft. at 85/6 per 100 sup. ft.	2	6	2
Add freight surcharge, 194 sup. ft. at 8/– per 100 ...		16	0
½″ dia. bolts and nuts 2′ long, No. 18 at 1/– each ...		18	0
Cartage —Softwood = 315 sup. ft. at 1/3		4	0
Hardwood = 194 sup. ft. at 2/6		5	0
Prime cost of material—per square of wall	£32	8	11
Material divided by four uses—per square	8	2	3
Preparation, labour erection and removal for first use ...	7	0	0
Nails, etc.		10	0
Cost per square of wall	£15	12	3

Cost, £1 8s. 2d. per sq. yd. of wall.

When one side only is required in concrete laid against natural face or existing work.

	£	s.	d.
Cost of both sides = £32 8s. 11d., less bolts, 18/– ...	31	10	11
Divide by 2 for one side	15	15	6
Divide by 4 for four uses	3	18	10
Preparation, erection and removal for first use	3	10	0
Nails, etc.		5	0
	7	13	10
Add for shoring struts, etc., labour only		10	6
Nett cost = 14/9 per square yard one side	8	4	4

Approximate Timber Required for Formwork.

Per square foot of contact area with concrete.

Floor slabs	area	x 2½ to 3 = super feet of timber
Beams	,,	x 3 to 3¼ = super feet of timber
Columns	,,	x 2 to 2½ = super feet of timber
Walls	,,	x 2½ to 3 = super feet of timber
Stairs	,,	x 5 to 5½ = super feet of timber

Example—Beam, 2ft x 1ft. x 10ft. long = 50 sq. ft contact area.
Then—50 x 3¼ = 162½ super feet timber required.

FORMWORK.

Example of Cost No. 3—per lineal foot.

For formwork to Lintel or Beam 24″ deep, 12″ wide, 10 feet long and 10 feet above floor.

	£	s.	d.
4 x 1¼ H.W. T. & G. Flooring Merch. = 65 sup. ft. at 99/9 per 100 sup. ft.	3	5	0
4 x 2 H.W. Joists and framing 7/7′ =33 sup. ft.			
4 x 3 H.W. Bearers, 2/10′ =20 ,,			
4 x 3 H.W. Toms & crosspieces 3/12′=36 ,,			
6 x 2 H.W. Sole plates 3/2′ =6 ,,			
95 at 84/3 ...	4	0	1
4 x 1 H.W. Braces, 3/4′ = 4 sup. ft. at 86/9		3	6
Add freight surcharge, 99 sup. ft. at 8/– per 100 ...		8	0
Wedges, tie pieces, etc.		3	0
Cartage—Hardwood, 164 sup. ft. at 2/6...		3	10
	£8	3	5
Divide by 3 uses	2	14	6
Labour—1st erection and removal	1	15	0
Nails, etc.		2	6
Nett Cost	£4	12	0

Nett cost = 9/3 per Lineal foot.

Cost per Square Yard of Boxing—Surface Area 5⅓ sq. yds. measured 3 surfaces, cost £4 12s. 0d.

Nett cost = 16/6 per sq. yard of Boxing.

This cost allows for 3 uses of timber.

Four or more uses of timber decreases the cost and may then be reckoned as a labour cost only according to contractor's judgment.

Example of cost No. 4—per lineal foot.

For formwork to lintel or beam 12″ deep, 6″ wide, 5 feet long and 5 feet up from sill.

	£	s.	d.
4″ x 1″ Cypress pine T. & G. flooring = 20 sup. ft. at 120/–	1	4	0
4 x 2 H.W. Joists & framing 4/4′ = 11 sup. ft.			
4 x 3 H.W. Bearers 1/5′ = 5 ,,			
4 x 3 H.W. Toms 1/5′ = 5 ,,			
6 x 2 H.W. Sole plates 1/2′ = 2 ,,			
23 sup ft. at 84/3		19	5
Add freight surcharge, 23 sup. ft. at 8/– per 100 ...		2	0
Cartage—Softwood = 20 sup. ft. at 1/3			3
Hardwood = 23 sup. ft. at 2/6			7
Nett cost of materials	£2	6	3
Divide material by 3 uses		15	3
Add Labour—1st erection and removal	1	0	0
Nails, etc.		1	0
Cost = 7/3 per lin. foot—nett cost per lintel	1	16	3

Summary of Formwork Costs—Per Square Yard.

The cost of materials is based on three uses of timber.

	Form Materials	Materials & Labour	Labour only
Suspended Floors — 1st Floor	Cypress Pine	15/10	7/–
,, ,, 2nd ,,	Cypress Pine	16/10	8/–
,, ,, 1st ,,	Oregon	16/10	7/–
,, ,, 2nd ,,	Oregon	17/10	8/–
Walls: Formed both sides one side only measured ...	6″ x 1½″ Oregon	28/2	15/–
Walls: Formed one side ...	6″ x 1½″ Oregon	14/9	8/–
Lintels and Beams —Area of Boxing measured ...	...T. &. G. Hardwood	16/6	7/6

PLANT HIRE RATES.

Concrete Mixers—Portable Power Operated.

	Per Week £ s. d.
Capacity 3 cu. feet including Petrol Engine	1 5 0
,, 5 ,, ,, Not including Engine	1 15 0
,, 7 ,, ,, ,, ,, ,, ...	2 1 0
,, 10 ,, ,, ,, ,, ,, ...	2 15 0
,, 15 ,, ,, ,, ,, ,, ...	3 10 0

Hoists.

	£ s. d.
Hoist Tower Approx. 100 ft. high	2 0 0
Electric Motor 15 H.P. and Drum	1 0 0

Lorry Rates—Per Hour.

		£ s. d.
Non Tipping Lorries:—Utility		
	20 cwt. or 1 yard	10 0
	30 ,, ,, 1½ ,, ...	10 6
	2 Tons ,, 2 yards	11 0
	3 ,, ,, 3 ,, ...	11 6
	4 ,, ,, 4 ,, ...	12 0
	5 ,, ,, 5 ,, ...	13 0
Tipping Trucks	2 ,, ,, 2 ,, ...	11 6
	3 ,, ,, 3 ,, ...	12 6
	4 ,, ,, 4 ,, ...	13 6
	5 ,, ,, 5 ,, ...	14 6

The cost of cement varies from 10 ton lots at 6/6 per bag to 7/11 delivered at Palm Beach. For this reason the general cost of concrete has been estimated on a basis of 7/6 per paper bag of cement. Any difference can be easily adjusted by contractors according to locality of job.

See cement price list for delivery prices.

A basis of 4 : 2 : 1 mixture is used in calculations.

Any variation in mix can be adjusted from ready mixed concrete prices.

Costs of Concrete—4-2-1 Mix—Per Cubic Yard—Machine Mixing—Ground Level Pouring.

	£	s.	d.
6 paper bags cement at 7/6 per bag	2	5	0
24 Cu. Ft. Blue Metal or Gravel ¾″ G. at 30/- per ton ...	1	10	0
Sand—12 cubic feet at 13/6 per ton		6	6
Water		1	0
Material only	£4	2	6
Machine mixing and pouring	1	13	6
Nett cost concrete in position	£5	16	0
For storey work add 10/- per cubic yard to above	£6	6	0
Hand Labour gauging, mixing and wheeling, add 10/- ...	£6	16	0

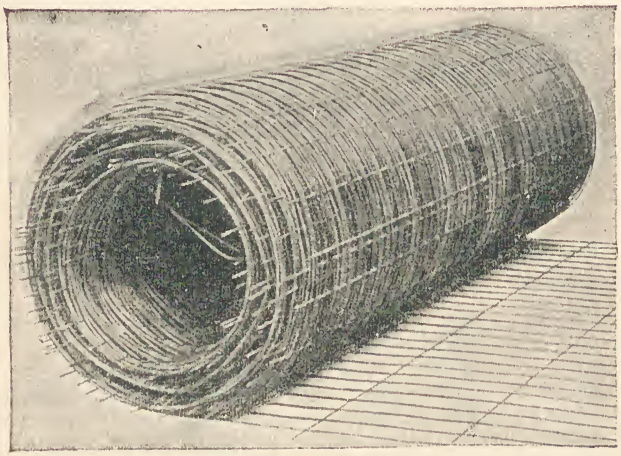
Add hire and depreciation of mixer hoist, etc., at 2/- per cu. yard.
Contractors to add incidental costs, profit, etc.
The above prices are used as a basis for the costs of floors, beams columns, walls, etc., in this book.

For quotes on concrete floors, roadways etc.—

See Advertisement, Page 28

REINFORCEMENT.

Floors, Roads and Slabs.



The best method of reinforcing concrete floors, roads and slabs is achieved by using steel fabric.

The ease of handling and the accuracy with which it can be placed in position, combined with the absence of risk of omission or displacement, makes it the safest and most economical to use.

B.R.C. Fabric consists of a steel wire mesh, made up of a series of parallel longitudinal wires, held at fixed distances apart by means of transverse wires at right angles to the longitudinal wires, securely welded to them at the points of contact by an electrical process. The wires are fused together into a homogeneous weld, making the weld actually stronger than the wires.

The fabric is made in standard sheets and/or rolls with wires of varying gauges to suit all types of floor and road construction.

The fabric is easily cut to size with wire cutters.

It is advisable to seek the advice of the manufacturers, as to sizes and gauges of fabric to be used in any particular job.

B.R.C. Fabric :—The wire used is best quality hard drawn steel wire with tensile strength from 80,000 to 100,000 lbs. per sq. inch. The elastic limit averages 65,000 lbs. per sq. inch, while the safe working tensile strength may be taken at 25,000 lbs. per sq. inch.

B.R.C. FABRIC.

Properties of Standard Sizes.

B.R.C. Fabric Reference Number	Approx. Price Per Square Yard NETT s. d.
1	7 0½
2	6 2½
3	5 7
4	4 10
5	4 3
6	3 7
7	3 0
7 Tr. Mesh	2 10
8	2 7
9	2 2
10	1 10½
12	1 7
14	1 4
611	4 0
622	3 3½
633	2 9
644	2 3
655	1 8½
666	1 6
688	1 3
610	1 0

325 Per standard sheet 10′ x 6′ £1 10s. 3d. Nett per sheet.
333 Per standard sheet 10′ x 6′ £1 13s. 4d. Nett per sheet.
1260 Galvanised Roofing Mesh, 10d. per square yard.

The above prices are **Nett** delivered in Sydney Metropolitan area, F.o.r., F.o.b. Sydney—for Standard Rolls or 5 Standard Sheets.

For cutting sheets to special sizes or cutting and bending, extra price on application. Not exceeding 10 per cent. on list.

For current prices and quotes See Advertisement, Page 20.

SUSPENDED CONCRETE SLABS.

Reinforced with B.R.C. Fabric.

The following table gives thickness of concrete and the corresponding B.R.C. Fabric for use over various spans in different classes of buildings.

Safe live load lbs. per sq. ft.	SPAN IN FEET.						
	6	7	8	9	10	12	14
Dwellings 40	4″ No. 12	4″ No. 10	4″ No. 9	4½″ No. 8	5″ No. 7	6″ No. 6	7″ No. 4
Offices 60	4″ No. 10	4″ No. 9	4½″ No. 8	5″ No. 7	5½″ No. 7	6½″ No. 5	7½″ No. 4
Garages 100	4″ No. 9	4½″ No. 8	5″ No. 7	5½″ No. 6	6″ No. 5	7½″ No. 4	8½″ No. 3

The designs are based on non-continuous simply supported spans to carry the live load shown plus the weight of the slab. The concrete is assumed of such mix as to give a strength of 2,000 lbs. per sq. inch at 28 days, and to be in accordance with current S.A.A. code. Reinforcement to have ¾″ clear concrete cover.

The following cost tables are summarized from detailed costs in this book for the convenience of tenderers. They are approximate prices for the Metropolitan area.

Extra cartage on timber, fabric, must be allowed on distant jobs.

COSTING TABLES—SUSPENDED FLOORS.

Showing Covering Capacity in sq. yards of one cubic yard concrete.

Also cost per sq. yd. floor (various thicknesses) at £5 16s. 0d. per cub. yard.

Also cost per sq. yd. of Formwork including erection and removal.

Thickness of floor	4″	4½″	5″	5½″	6″	6½″	7″	7½″	8″	8½″
Square Yds. per Cu. Yd. concrete	9	8	7·2	6·54	6	5·54	5·15	4·8	4·5	4·235
Cost per sq. Yd. Concrete ...	13/–	14/6	16/2	17/9	19/4	21/–	22/7	24/2	25/10	27/5
Cost Per Sq. Yd Formwork ...	15/6	15/6	15/6	15/6	16/–	16/6	17/6	17/6	17/6	17/6

The above costs are nett costs.

Contractors to add hiring costs, profit, etc.

The following examples of Cost are based on 4 : 2 : 1 Concrete Mix. For variations in Mixes see Ready Mixed Concrete section.

FLOORS IN DWELLINGS—PER SQUARE YARD LAID.

Example No. 1—6 ft. span—4″ thick—No. 12 Fabric.	£	s.	d.
Concrete at £5 16s. 0d. per cubic yard		13	0
Formwork—Erection and Removal		15	6
Fabric No. 12—Nett Cost		1	8
Labour Cutting and Laying Fabric			7
Nett Cost Per Sq. Yard	£1	10	9

Example No. 2—7 ft. span—4″ thick—No. 10 Fabric.	£	s.	d.
Add extra on above, 4d. per sq. yd. for fabric	£1	11	1

Example No. 3—8 ft. span—4″ thick—No. 9 Fabric.			
Add extra on No. 1 Example—7d. per sq. yd. for Fabric	£1	11	4

Example No. 4—9 ft. span—4½″ thick—No. 8 Fabric.			
Concrete laid 4½″ thick		14	6
Formwork		15	6
Fabric No. 8		2	8
Labour Cutting and laying fabric			9
Nett Cost Per Square Yard	£1	13	5

Example No. 5—10 ft. span—5″ thick—No. 7 Fabric.			
Concrete, 5″ thick		16	2
Formwork		15	6
No. 7 Fabric		3	1
Labour Cutting and Laying Fabric			9
Nett Cost Per Square Yard	£1	15	6

Example No. 6—12 ft. span—6″ thick—Fabric No. 6.			
Concrete, 6″ thick		19	4
Formwork		16	0
No. 6 Fabric		3	8
Labour on Fabric			10
Nett Cost Per Sq Yard	£1	19	10

Example No. 7—14 ft. span—7″ thick—No. 4 Fabric.			
Concrete		22	7
Formwork		17	6
No. 4 Fabric		4	11
Labour Cutting and Laying Fabric			10
Nett Cost Per Square Yard.	£2	5	10

OFFICE FLOORS—PER SQUARE YARD.	£	s.	d.
Example No. 1—6 foot span—4″ thick—No. 10 Fabric—See Dwellings	1	11	1
Example No. 2—7 foot span—4″ thick—No. 9 Fabric—See Dwellings	1	11	4
Example No. 3—8 foot span—4½″ thick—No. 8 Fabric—See Dwellings	1	13	5
Example No. 4—9 foot span—5″ thick—No. 7 Fabric—See Dwellings	1	15	6
Example No. 5—10 ft. span—5½″ thick—No. 7 Fabric.			
Concrete		17	9
Formwork		15	6
Fabric		3	1
Cutting and Laying Fabric			10
Nett Cost Per Square Yard	£1	17	2
Example No. 6—12 ft. span—6½″ thick—No. 5 Fabric.			
Concrete	1	1	0
Formwork		16	6
No. 5 Fabric		4	4
Cutting and Laying Fabric			10
Nett Cost Per Square Yard	£2	2	8
Example No. 7—14 ft. span—7½″ thick—No. 4 Fabric.			
Concrete	1	4	3
Formwork		17	6
Fabric No. 4		4	11
Cutting and Laying Fabric			10
Nett Cost Per Square Yard	£2	7	6

GARAGE FLOORS—PER SQUARE YARD.	£	s.	d.
Example No. 1—6 foot span—4″ thick—No. 9 Fabric—(See Offices)	1	11	4
Example No. 2—7 foot span—4½″ thick—No. 8 Fabric (See Offices)	1	13	5
Example No. 3—8 foot span—5″ thick—No. 7 Fabric—(See Offices)	1	15	6
Example No. 4—9 foot span—5½″ thick—No. 6 Fabric.			
Concrete		17	9
Formwork		15	6
Fabric		3	8
Cutting and Laying Fabric		1	1
Nett Cost Per Square Yard	£1	18	0

Example No. 5—10 ft. span—6″ thick—No. 5 Fabric.	£	s.	d.
Concrete		19	4
Formwork		16	0
Fabric		4	3
Laying Fabric		1	2
Nett Cost Per Square Yard	£2	0	9

Example No. 6—12 foot span—7½″ thick—No. 4 Fabric.			
—(See Offices)	£2	7	6

Example No. 7—14 ft. span—8½″ thick—No. 3 Fabric.			
Concrete	1	7	5
Formwork		17	6
Fabric		5	7
Laying Fabric		1	2
Nett Cost Per Square Yard	£2	11	8

LINTELS AND BEAMS.

REINFORCING MILD STEEL BARS.

Under 5 Ton Lots—Per Ton.

	⅜″ to 1¼″ Diam.			⅝″ Diam.			¼″ Diam.		
	£	s.	d.	£	s.	d.	£	s.	d.
Straight	27	14	6	30	5	0	31	2	0
Bent	32	14	6	35	5	0	36	2	0
Composite	32	8	9	34	19	6	35	16	3

Over 5 Ton Lots—Per Ton.

Straight	26	0	9	28	11	3	29	8	3
Bent	32	3	6	34	13	9	35	10	9
Composite	31	17	6	34	8	3	35	5	0

Extra for lengths over 35 feet.

Processing	Under 5 Tons.			Over 5 Tons.		
Straight	6	17	0	5	3	6
Bent	11	17	0	11	5	6
Composite	11	11	0	11	0	0

LINTELS AND BEAMS.

Concrete and Reinforcing Steel—Per Cub. Yard.	£	s.	d.
Concrete	5	16	0
Steel Reinforcement—2 cwts at £28 ton	2	16	0
Labour Placing Steel Reinforcement	1	3	0
Nett Cost Per Cubic Yard	£9	15	0
Formwork Labour and Materials per sq. yd.		16	5
Formwork Labour Only, per sq. yd.		7	6
Stripping and Cleaning Formwork per sq. yd.		3	0

Example of Cost No. 1—Timber for Forms included—For Lintel 10″ x 9″ x 9′ length

	£	s.	d.
Concrete and Steel = $\frac{1}{3}$ cu. yd. at £9 15s. 0d.	1	19	0
$2\frac{1}{2}$ sq. yds. Formwork at 16/6	2	1	3
Stripping and Cleaning $2\frac{1}{2}$ sq. yds. at 4/–		10	0
Nett Cost of Lintel	£4	10	3

Cost = 10/– per Foot Run.

Example No. 2—Labour only to Formwork—For Lintel—10″ x 9″ x 9′ length.

	£	s.	d.
Concrete and Steel = $\frac{1}{3}$ cu. yd. at £9 15s. 0d.	1	19	0
Labour only to forms $2\frac{1}{2}$ sq. yds. at 7/6 per yard ...		18	9
Stripping and Cleaning $2\frac{1}{2}$ yds. at 4/–		10	0
Cost = 7/7 per lin. foot—Nett Cost of Lintel	£3	7	9

TIMBER COST FOR FORMWORK INCLUDED.

Example No. 3—(For Lintel 18″ x 14″ x 12 feet).

	£	s.	d.
Concrete and Steel, $\frac{7}{9}$ cu. yds. at £9 15s. 0d. cu. yd. ...	7	11	8
$5\frac{1}{2}$ sq. yds. Formwork at 16/5 per sq. yd.	4	10	4
Stripping and Cleaning $5\frac{1}{2}$ sq. yds. at 4/– sq. yd. ...	1	2	0
Cost = 22/– per foot run.—Nett Cost of Lintel ...	£13	4	0

Example No. 4—Labour only to Formwork Allowed—for Lintel 18″ x 14″ x 12 feet.

	£	s.	d.
Concrete and Steel $\frac{7}{9}$ cu. yd. at £9 15s. 0d. cu. yd. ...	7	11	8
Labour only to $5\frac{1}{2}$ sq. yds. Forms at 7/6 sq. yd. ...	2	1	3
Stripping and Cleaning $5\frac{1}{2}$ sq. yds. at 4/– sq. yd. ...	1	2	0
Cost = 18/– per foot run—Nett Cost of Lintel	£10	14	11

Example No. 5—Timber Cost for Forms included—For Beam 24″ x 12″ x 12 feet.

	£	s.	d.
Concrete and Steel $\frac{8}{9}$ cu. yds. at £9 15s. 0d. cu. yd. ...	8	13	4
$6\frac{2}{3}$ sq. yds. Form Work at 16/5 sq. yd.	5	9	6
$6\frac{2}{3}$ sq. yds. Stripping and Cleaning at 4/– sq. yd. ...	1	6	8
Cost = £1 6s. 0d. per foot run.—Nett Cost of Beam ...	£15	9	6

Example No. 6—Labour only to Forms Allowed—For Beam 24″ x 12″ x 12 feet.

	£	s.	d.
Concrete and Steel $\frac{8}{9}$ cu. yds. at £9 15s. 0d.	8	13	4
Labour $6\frac{2}{3}$ sq. yds. Forms at 7/6 sq. yd.	2	10	0
Labour $6\frac{2}{3}$ sq. yds. Stripping at 4/– sq. yd.	1	6	8
Cost = £1 0s. 10d. per foot run—Nett Cost of Beam	£12	10	0

CONCRETE CASING TO ROLLED STEEL JOISTS.

Example No. 1—6″ x 3″ R.S.J.— Casing 10″ x 7″—10 feet long —
Timber for Forms not allowed.

	£	s.	d.
$\frac{1}{5}$ Cubic Yards Concrete at £5 16s. 0d.	1	3	3
Labour only to Forms, $2\frac{2}{3}$ sq. yds. at 7/6	1	0	0
$2\frac{2}{3}$ sq. yards Stripping at 4/–		10	8
Cost = 5/5 per foot run—Nett Cost	£2	13	11

Timber for Forms add 8/6 per sq. yard.

Example No. 2—9″ x 4″ R.S.J.— Casing 13″ x 8″—12 ft. long.

	£	s.	d.
$\frac{1}{3}$ cu. yards concrete at £5 16s. 0d.	1	18	8
Labour only to Forms, 4 sq. yds. at 7/6	1	10	0
4 sq. yds. Stripping at 4/–		16	0
Cost = 7/1 per foot run—Nett Cost	£4	4	8

Example No. 3—10″ x 6″ R.S.J.—Casing 14″ x 10″—12 ft. length.

	£	s.	d.
$\frac{4}{6}$ cu. yds. concrete at £5 16s. 0d.	2	11	7
Labour only to Forms, $4\frac{1}{2}$ sq. yds. at 7/6	1	13	9
$4\frac{1}{2}$ sq. yds. Stripping at 4/–		18	0
Cost = 8/7 per foot run—Nett Cost	£5	3	4

Example No. 4—15″ x 6″ R.S.J.—Casing 19″ x 10″—12 ft. length.

	£	s.	d.
$\frac{2}{3}$ cu. yds. Concrete at £5 16s. 0d.	3	17	4
Labour only to Forms $5\frac{5}{6}$ sq. yds. at 7/6	2	1	8
$5\frac{5}{6}$ sq. yds. Stripping at 4/–	1	2	3
Cost = 11/9 per foot run—Nett Cost	£7	1	3

Example No. 5—24″ x 7½″ R.S.J.—Casing 28″ x 12″—12 ft. length.

	£	s.	d.
$1\frac{1}{6}$ cu. yds. concrete at £5 16s. 0d.	6	7	10
Labour only to Forms— $7\frac{7}{9}$ sq. yds. at 7/6	2	18	4
$7\frac{7}{9}$ sq. yds. Stripping at 4/–	1	11	2
Cost = 18/1 per foot run—Nett Cost	£10	17	4

COMPRESSED AIR

ITS APPLICATION AND PERFORMANCE.

The Builder or Contractor has the following information at his disposal for the purpose of speeding up his programme, and at the same time reducing the final cost of the particular scheme.

AIR COMPRESSORS.

(By Courtesy of Consolidated Pneumatic Tool Co. Ltd.)

Portable Diesel Driven Air Compressors, ranging in size from 60 cubic feet per minute to 315 C.F.M. and as listed below.

60	C.F.M.	Machine	Operates	—	1	Demolition Tool.
100	,,	,,	,,		2	Demolition Tools.
160	,,	,,	,,		3	,, ,,
200	,,	,,	,,		4	,, ,,
315	,,	,,	,,		6-7	,, ,,
500	,,	,,	,,		12-14	,, ,,

Prices Range from £750-£5,500 approximately.

These machines are two stage Air Cooled Units thus obviating any worry as to cooling water for the Compressor end. By this means a better performance is obtained rather than using the old single stage water-cooled principle.

Various Pneumatic Tools can be used on the above units, particular applications being :—Wall-Plugging, Drilling, Reaming, Tapping, Grinding, Sand-blasting, Chipping, Caulking, Riveting, Vibrating (externally or internally), Rock Drilling, Demolition Work, Paint Spraying, etc. etc.

STATIONARY COMPRESSORS.

These machines are used mainly in permanent installations such as Foundries, Structural Workshops, Furniture Manufacturers, Engineering Shops, Glass Plants, Stove, Sink, Pipe, and Tile Makers, and so on.

The sizes obtainable range as follows :—

30 cubic feet per minute at 100 lbs. per square inch pressure.
40 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
70 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
100 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
115 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
120 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
160 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
200 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
215 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
323 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,

Prices range from £175 to £2,530 approximately.

The figures are for the Compressor only which includes in each case an Automatic Free Air Unloader and Air Filters (intake) as the case may be.

PNEUMATIC TOOLS.

The following Tools are particularly useful to the Builder for average to large structures such as city buildings.

Boyer Riveting Hammer for Hot Rivets from $\frac{3}{8}$" to $1\frac{1}{8}$". Blows per minute, 1,050. Weight to $22\frac{1}{4}$ lbs.—£28 each.

Pneumatic "Simplate" Chipping Hammer for chipping, caulking, scaling or beading work.—£24 each.

"C.P." Pneumatic Drilling Machines varying in capacity from $\frac{1}{4}$" in mild steel to up to 3". Can be used also for tapping and reaming.—£21 to £120 each.

Portable Pneumatic Wood Boring machines reversible with capacity 1" and 2".—£48 to £64 each.

"C.P." Pneumatic Grinders for use on light die work, and the larger sizes on steel, cast iron, etc.—£46 to £52 each.

"C.P." Angle Sander and Grinder can be used for wire brush cleaning and polishing.—£72 to £80 each.

"C.P." Pneumatic Impact Wrenches are of the reversible type for applying or removing nuts or bolts ranging in size from $\frac{3}{8}$" to $1\frac{1}{4}$".—£60 to £94 each.

"C.P." Pneumatic Immersion Type Vibrators for reinforced and massed concrete. Four times greater tensile strength obtained —reduces amount of water to be used and concrete dries much more quickly.

The various tools set out hereunder are mainly applicable for the Contractor in Excavations, Trench Digging, Sewerage Schemes, Quarrying, Brick and Tile Pits, etc.

"C.P." Pneumatic Rock Drills for drilling of holes up to a depth of 15-20 feet in medium to hard rock. Particularly noted for their drilling speed and can be used for either wet or dry boring. $\frac{7}{8}$" or 1" Hex Drill Steel can be used.—£48 to £83 each.

"C.P." 117 Demolition Tool 75 lbs. weight. For tearing out concrete and brick foundations and walls, pavement breaking, trenching, etc.—£63 each approx.

"C.P." Claydigger for open cut and trench work in medium to hard clay. Machine can be used for light demolition work by fitting peg point in lieu of spade.—£42 each.

"C.P." Pneumatic Sump Pump. The best friend for the Contractor. These machines remove water from manholes, ditches or pits quickly and cheaply. No priming is necessary and the pump is capable of discharging 90 Imperial gallons per minute against a 45 foot head.—£65 to £125 each.

"C.P." Rotary Pneumatic Coal or Shale Borer. Particularly useful for coal mines (colliery or open cut). Holes up to 12' can be drilled using Tungsten Carbide Bits with twist steel augers. Brick and tile pits have considerably increased their output with this mechanical method.—£61 10s. to £64 10s. each.

"C.P." 50 cycle Electric Coal or Shale Drill also applicable to Coal Pits, open cut, and brick and tile quarries. Machines can be obtained in the various voltages 415V., 125V., and 32V.—£74 to £79 each.

DRAINER

Glazed stoneware pipe, being a vitrified product, is practically indestructible. It is resistant to chemicals, earth and drainage acids.

METHOD OF COSTING.

To maintain accuracy in costing, the various "Examples of Cost" are shown as a nett cost of pipes and laying **without excavation.** Because of the difference in terrain, the excavation costs in soil, rock, shale, etc. are shown separately and must be added or combined to the nett cost of pipes. Examples are shown and any alteration can be quickly adjusted to keep the costs up-to-date.

A table showing the number of cubic yards per 100 feet of trenching, at various depths and widths, is provided for quick costing. This is followed by the cost per cubic yard of various excavations.

Bends, elbows, single junctions, taper pipes and taper bends are double the price of ordinary pipes of same size.

Double junctions are treble the price of pipes.

In estimating it is easier to measure all work as ordinary pipes, then add fittings and deduct an equal length of pipes from total.

Inspection pipes, traps, gully traps to be added separately.

Add connecting to sewer fees, etc., on costs.

FEES AND CHARGES.

Sewer Connection—Fee to M.W.S. and D.B.—Layout Plan, 5/-each.

Piercing Kerb—Suburban Councils, 10/- to 15/—City Council—£1 11s. 0d. each.

Footpath openings—Suburban Councils.	Each.
Gravel or earth—formed or unformed	7/6 to 12/6
Tar or bitumen	16/- to 20/-
Concrete pavement under 6 feet wide	20/- to 22/-
Concrete pavement over 6 feet wide	30/- to 33/-
Gravel or ashes or similar	15/-
Tunnelling under paths—no damage to surface ...	7/6 to 10/-
A minimum fee of 10/- is charged by most councils.	

Roadway Openings.	Each
Shoulders earth or shale	15/-
Roads, unmade, not under traffic	7/6
Roads, formed or unformed, under traffic, including shoulders	£1 0s. 0d.
Gravel on natural subgrade including shoulders...	£1 10s. 0d.
Ballasted and gravelled or Macadam including shoulders	£1 16s. 0d.
Tar or Bitumen Macadam (first 10 ft.) including shoulders	£2 to £2 5s. 0d.
Tar or Bitumen Macadam (to 20 ft.) including shoulders	£4 to £4 10s. 0d.
Tar or Bitumen Macadam (over 20 ft.) including shoulders	£5
Asphalt Concrete—without cement base up to 10 sq. ft.—including shoulders	£3 5d. 0d.
Asphaltic Concrete—each additional square foot	2/-

FEES AND CHARGES

Asphaltic Concrete—with cement base and as before £6 5s. 0d.
Asphaltic Concrete—each additional square foot... 3/9
Cement Concrete up to 10 sq. ft. including shoulders ... ... £4 5s. 0d.
Cement Concrete—each additional square foot ... 3/–
Pot Hole in road (except concrete), 2/– per sq. ft.—minimum, £1.
Some councils charge 50 per cent. on above rates for sewer connections.

Vehicle Entrances—Residential only. Each
Dish Crossing at Kerb—No footpath paving ... £7 0s. 0d.
Dish Crossing and Paving to building line where there is Kerb and Gutter and Paved Footpath:—
To 12 ft. wide, £15; to 15 ft. wide, £17 10s. 0d.; over 15ft. wide, £20.
Vehicle Entrances—Industrial or Commercial—For 8 feet gate widths. Footpath to 12 ft. wide, £22; to 15 ft. wide, £26; to 18 ft. wide, £28.
Where gate widths are over 8 feet the charge is increased proportionately.

Any alterations to drainage, sullage, etc., are charged extra to above.

£15 Deposit to be lodged with council, against damage to footpath, gutters, etc., during building operations, and is refundable on completion, less costs of damage.

Hoarding Fees, 10/–. Applicants to erect, maintain and keep warning lights on hoardings.

Hire of Pipe Pushing Machine and operator.—Deposit £2 and 8/6 per hour for 1st two hours (minimum); 6/– per hour for additional time.

COST OF PIPE FITTINGS—Each.

These may be added to cost of pipes, and then deduct cost only of one pipe where necessary.

Size	Inspection Pipes each	Including surcharge 17%	Inspection Bends each	Including surcharge 17%	Inspection junctions each	Including surcharge 17%
4″	7/6	8/10	8/8	10/3	9/10	11/7
6″	9/1	10/9	10/3.	12/–	11/9	13/10

Size	P. Traps. Plain each	Including surcharge 17%	P. Traps Inlet each	Including surcharge 17%
4″	8/3	9/9	9/10	11/7
6″	14/2	16/8	17/4	20/5
9″	34/7	40/8	51/2	60/2
12″	94/5	110/11	—	—

COST OF PIPE FITTINGS—Each.

Size	Gulley Traps Plain each	Including surcharge 17%	Cost with 4″ Inlet each	Cost with 6″ Inlet each	Add for grates extra each
6″	11/5	13/5	15/–	15/9	1/7
8″	14/2	16/8	18/3	19/–	2/4
10″	18/1	21/3	22/10	23/7	3/1
12″	21/2	24/11	26/6	27/3	4/9

Size	Risers Plain each	Including surcharge 17%	Add for extra Inlets 4″ each
4″	2/–	2/5	—
6″	3/1	3/8	1/11
8″	4/9	5/7	1/11
10″	5/6	6/6	1/11

COST OF DRAIN PIPE ACCESSORIES—EACH.

Supply only—Including 17% Surcharge.

Collars Plain, 4″, 2/3. Sinkstones, 16/7. Sinkstone Grates, 2/4.

Inspection Boxes, 4/9. Grease Trap and Grate, 110/4. Grease Trap Grates, 9/4.

Discs, 4″, 7d.; 6″, 10d.; 9″, 2/3; 12″, 3/8; 16″, 5/7. Reflux Sinks, 101/3.

Flap Traps, 6″, 53/4; 9″, 61/8; 12″, 84/9 each.

Perforated Pipes, 4″, 5/–; 6″, 6/11 each.

Channel Pipes, 4″, 2/9; 6″, 3/8; 9″, 6/6; 12″, 10/2 each.

SPECIAL FITTINGS—Each	Including 17% Surcharge
N.1. Interceptor Traps, 4 inch, 11/5 each	13/5
N.2. 4 in. x 4 in. Adjustable top oblique, 4/9 each	5/7
N.3. ,, ,, ,, ,, Level 8/–, each	9/5
N.4. ,, ,, ,, ,, Square, 4/9 each	5/7
N.5. ,, ,, ,, ,, Right Angle, 7/1 each ...	8/4
N.6. Yard sink basin and galv. grate, 27/6	32/4
N.23 Interceptor Trap, 6 ins., 17/4 each	20/5
N.30 Double socket 4 ins., 3/1 each	3/8
N.31 ,, ,, 6 ins., 4/9 each	5/7

COVER REQUIRED FOR DRAIN PIPES.

Internal work inside building line, 12″ minimum cover

External—Roadway, etc., 2′–6″ minimum cover.

TABLE OF COST NO. 1—Cost Per Foot Laid.
Trench Excavation not Included.
1st Quality Glazed Earthen Ware Pipes.

Size Inside diam.	Base cost per foot	Plus 17% sur-charge	Labour laying & jointing	Net cost per foot	Pipes per ton	Feet per ton
3″	1/2½	1/5	1/3	2/8	120	240
4″	1/2½	1/5	1/3	2/8	90	180
6″	1/8½	2/–	1/6	3/6	55	110
9″	3/3	3/10	3/–	6/10	32	64
12″	4/8½	5/6½	5/–	10/6½	20	40
16″	7/6	8/10	5/6	14/4	14	28
18″	9/5	11/1	6/–	17/1	11	22
21″	16/6½	19/5	7/–	26/5	9	18
24″	19/8½	23/2	7/3	30/5	7	14

TABLE OF COST NO. 2—Nett Cost Each—Laid.
Bends, elbows, single junctions, taper pipes and taper bends.
Excavation not Included.

Size	Base cost each	Plus 17% surcharge	Labour laying & jointing	Net cost each
3″	4/9	5/7	2/6	8/1
4″	4/9	5/7	2/6	8/1
6″	6/10	8/–	3/–	11/–
9″	13/–	15/3	6/–	21/3
12″	18/10	22/1	9/–	31/1
16″	30/–	36/2	10/6	46/8
18″	37/8	44/1	12/–	56/1
21″	66/2	77/5	13/6	90/11
24″	78/10	92/3	15/–	107/3

TABLE OF COST NO. 3—Nett Cost Each—Laid.
Double Junctions—Excavation not included.

Size	Base cost each	Plus 17% surcharge	Labour laying & jointing	Nett cost each
3″	7/1½	8/4	2/6	10/10
4″	7/1½	8/4	2/6	10/10
6″	10/3	12/–	3/–	15/–
9″	19/6	22/10	6/–	28/10
12″	28/3	33/1	9/–	42/1
16″	45/–	52/8	10/6	63/2
18″	56/6	62/2	12/–	78/2
21″	99/3	116/1	13/6	129/7
24″	118/3	138/4	15/–	153/4

DRAINER.

EXCAVATION—TABLE NO. 4.
Cubic Yards per 100 Lineal Feet of Trench.

Width of Trench	Depth of Trench.				
	2 feet	3 feet	4 feet	5 feet	6 feet
1′–3″	9½	14	18½	23¼	27¾
1′–4″	9⅞	14⅞	18¾	24¾	27⅞
1′–6″	11⅑	16⅔	22⅔	27⅚	33⅓
1′–9″	13	19⅘	26	32⅝	38⅞
2′–0″	14⅞	22⅔	29⅔	37⅙	44⅘
2′–4″	17⅓	26	34⅔	43¼	51⅞
2′–6″	18⅔	28	37	46½	55½
2′–9″	20⅘	30⅝	40⅞	51	61⅕
3′–0″	22⅔	33⅓	44⅘	55⅝	66⅔

BASIC COST OF TRENCH EXCAVATION—Per Cubic Yard.
Beyond 1 Foot Depth Add Depth Allowance.
Prices include Filling In.

In soil	19/–
In rock	93/–
In rock (where use of explosives is prohibited)	102/–
In Shale	32/–
In soft clay	22/–
In hard clay	25/–

Depth Allowance.

For extra cost for depth allow 6½ (D + 1) pence where D = depth in feet.

EXAMPLE :—Trenching in soil 6 feet deep—

6½ (6 + 1) pence = 6½ x 7 pence = 3/9½ per cu. yd.
then basic cost in soil = 19/–
Depth Allowance = 3/9½

Cost of trench 6 feet deep = 22/9½ per cu. yd.

EXAMPLES SHOWING METHOD OF COSTING.

Example No. 1—100 Feet Run Laid—Laying 4″ Drain Pipes 3 Feet Deep in Soil.

	£	s.	d.
100 ft. 4″ Pipes at 2/8 per ft. (Table No. 1)	13	6	8
Trenches 16″ x 3′ deep (Table No. 4) 14⅞ cu. yds. at 21/2 (Table 5)	15	14	11
Cost = 5/10 per foot. Net Cost 100 feet	£29	1	7

Examples include depth allowance for excavation.
Add Fittings, etc., on above price.

Example No. 2—100 ft. Run Laid—Laying 4″ Drain Pipes, 3 feet deep in Shale.

	£	s.	d.
Laying 100 ft. Pipes at 2/8 per foot	13	6	8
Trenches 16″ wide. 14⅞ cu. yds. at 34/2	25	8	4
Cost = 7/9 per foot. Net Cost 100 ft. in Shale	£38	15	0

TABLE NO. 5—TRENCH EXCAVATION COSTS FOR VARIOUS DEPTHS.

Using Depth Allowance Formula.
Cost Per Cubic Yard.

Depth	2	3	4	5	6	7	8	9	10
Soil	20/7½	21/2	21/8½	22/3	22/9½	23/4	23/10½	24/5	24/11½
Rock	94/7½	95/2	95/8½	96/3	96/9½	97/4	97/10½	98/5	98/11½
Rock (No explosive) ...	103/7½	104/2	104/8½	105/3	105/9½	106/4	106/10½	107/5	107/11½
Shale	33/7½	34/2	34/8½	35/3	35/9½	36/4	36/10½	37/5	37/11½
Soft Clay ...	23/7½	24/2	24/8½	25/3	25/9½	26/4	26/10½	27/5	27/11½
Hard Clay ...	26/7½	27/2	27/8½	28/3	28/9½	29/4	29/10½	30/5	30/11½

AGRICULTURAL PIPES—TERRA COTTA—Supply Only

Size Internal Diameter	Cost Per 100 £ s. d.	Surcharge 17% £ s. d.	Total cost per 100 £ s. d.	Total cost per foot £ s. d.	Number of feet per ton.
2″	2 1 4	0 7 1	2 8 5	0 0 6	900
3″	2 8 9	0 8 4	2 17 1	0 0 7	375
4″	2 19 0	0 10 1	3 9 1	0 0 8½	250
6″	4 8 6	0 15 1	5 3 7	0 1 0½	145

Add excavation and labour laying.

SAND FILLING TO DRAIN PIPES—Per 100 Feet Run.

Sand filling around and up to 3″ above pipes laid in trenches :—

6″ diameter pipes ...	52/–	16″ diameter pipes ...	104/–
9″ ,, ,, ...	65/–	18″ ,, ,, ...	123/–
12″ ,, ,, ...	78/–	21″ ,, ,, ...	143/–
15″ ,, ,, ...	104/–	24″ ,, ,, ...	220/–

Sandfilling of Trenches other than above—8/– per cubic yard.
Sandfilling around pipes in tunnels—11/– per cubic yard.

SCHEDULE OF PRICES—LABOUR ONLY.

Laying and jointing salt-glazed ware pipes including discs:—

21″ diameter pipes	Lin. Ft.	7/–
18″ ,, ,, ...	,,	6/–
16″ ,, ,, ...	,,	5/6
12″ ,, ,, ...	,,	5/–
9″ ,, ,, ...	,,	3/–
6″ ,, ,, ...	,,	1/6
4″ ,, ,, ...	,,	1/3
Bedding pipes, 4″ to 12″ diameter inclusive in 1:4 mortar, including the supply of mortar	,,	–/10
Bedding pipes 15″ to 21″ diameter inclusive in 1:4 mortar, including the supply of mortar	,,	1/–
Laying and jointing salt glazed ware junction pipes any size including discs, extra price	,,	25%
Fixing and jointing 9″ salt glazed ware bends ...	Each	6/–
Fixing and jointing 6″ salt glazed ware bends ...	,,	3/–
Taking up, cleaning and re-laying, if required, existing drains, exclusive of excavation ...	Lin. Ft.	2/6
Puddle, providing and placing	Cu. Yd.	24/–
Portland Cement	Cu. Ft.	9/–
Ballast, packed, any gauge	Cu. Yd.	30/–

SCHEDULE OF PRICES—LABOUR ONLY.

Laying and jointing cast iron pipes, any lengths, including junctions and discs and excavation of caulk holes :—		
6″ diameter	Lin. Ft.	–/8
9″ ,, ...	,,	–/9
12″ ,, ...	,,	1/6
15″ ,, ...	,,	1/6
18″ ,, and over	,,	2/–
Laying and jointing concrete pipes, including junctions and discs :—		
15″ diameter	Lin. Ft.	4/–
18″ ,, ...	,,	5/–
21″ ,, ...	,,	6/–
24″ ,, ...	,,	6/6
Cartage of surplus spoil per half mile or part thereof	Cu. Yd.	1/6
Testing pipe lines, 4″ to 12″ dia. inclusive by smoke or hydrostatically	100-ft.	10/–
Testing pipe lines, 15″ to 24″ dia. inclusive by smoke or hydrostatically	,,	12/–

WEIGHTS OF DRAIN PIPE FITTINGS.

	4″ No. per ton.	6″ No. per ton.	8″ No. per ton.
Inspection Bends ...	128	72	—
,, Pipes ...	80	57	—
90° ,, Bends ...	30	72	—
90° Bends long ...	143	112	—
,, ,, short ...	187	—	—
Square junctions ...	72	55	—
Inspection ,, ...	49	45	—
Riley bends	213	34	—
P. Traps	74	57	—
Riser's Plain	—	128	128
Gulley	—	67	47
Slope junction	65	47	—
Trap ,, ...	60	—	—

Taper pipe 6 x 4, 147 per ton : Riser 4 x 4 ... ... 128 per ton
Taper bends 6 x 4, 34 per ton : Riser 4 x 4 Double short square ... ... 101 ,, ,,
Riser 6 x 4 x 4, 77 per ton : Riser 6 x 4 ... ... 95 ,, ,,
Riser 6 x 6, 78 per ton : Riser 8 x 4 Inlet ... ... 77 ,, ,,
Sinkstones, 101 per ton.

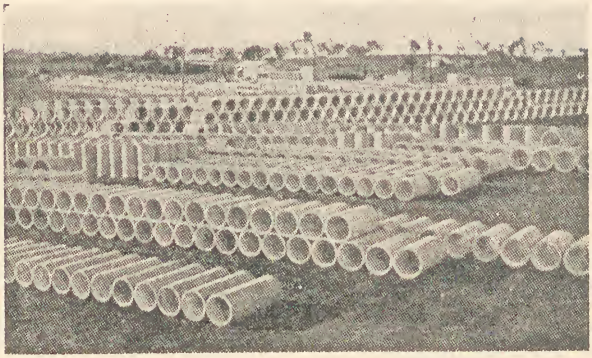
RECOMMENDED FALLS FOR SELF-CLEANING PIPES.

3″	4″	6″	9″	12″	16″	18″	21″	24″
1 in 30	1 in 40	1 in 60	1 in 90	1 in 120	1 in 160	1 in 180	1 in 210	1 in 240

JOINTS IN 2 TO 1 CEMENT MORTAR

One Bag Cement and 2 cu. feet Sand for 60 Joints on 4″ Pipes.
One Bag Cement and 2 cu. feet Sand for 40 Joints on 6″ Pipes.
Materials Cost :—Bag Cement, 8/4 ; Sand 12/– per cu. yd.

CONCRETE DRAINAGE PIPES.



Hume Concrete Drainage Pipes.

Hume Concrete Pipes are manufactured for all purposes, viz., water supply, sewerage, drainage, culverts, irrigation water tanks, septic tanks etc.

Manufactured in Class C — Non Reinforced.
Class S — Reinforced.
Class X — Extra Strength Reinforcement.

CONCRETE DRAINAGE PIPES—N.S.W. Prices.

Manufactured to Aust. Std. Specn A35/1937 for Conc. Pipes (Precast).

Joints ...	S. & S.	Spigot & Socket Spigot & Faucet.
	Butt	Includes Ext. Flush Joint ,, Int. ,, ,,

Class " C " ...	Cement Concrete Pipes. Non-Reinforced.
Class " S " ...	Std. Reinforced Concrete Pipes.
Class " X " ...	Extra Strength Reinforcement Pipes.

SEE FOLLOWING PAGES FOR PRICES.

CONCRETE DRAINAGE PIPES N.S.W. PRICES.

Diameter	4″				6″				9″				12″				15″	
Joint	S. & S.		Butt		S. & S.		Butt		S. & S.		Butt		S. & S.		Butt		S & S.	B
Class	N.R. R.		N.R. R.		N.R. R.		N.R. R.		N.R. R.		N.R. R.		N.R. R.		N.R. R.			
	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	S	S
Feet Per Ton	144	144	165	165	93	93	106	106	57	57	64	64	38	38	40	40	30	32
Rate per lin. ft. on lorry at works	1/2½	1/4	1/2½	1/4	1/9	2/5	1/9	2/4	3/4½	3/6½	2/11½	3/2½	4/1	5/–	3/8	4/8	6/6	6/4
"X" Class extra/Ft.										4d.		4d.		5d.		5d.	6d.	5d.
½ Pipes (semi-circles)		1/–		1/–		1/7		1/7		2/3		2/2		3/3		3/11	4/4	4/–

Freight and Cartage to be added.

For Further Information See Advertisement, Page 10

CONCRETE DRAINAGE PIPES N.S.W. PRICES.

Diameter	18″		21″		24″		27″		30″		33″	36″	42″	48″	54″	60″	66″	72″
Joint	S.& S.	B.	S.& S.	B.	S.& S.	B.	S.& S.	B.	S.& S.	B.	B.	B.	B.	B.	B.	B.	B.	B.
Class	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Feet Per Ton ...	20	22	15	17	12	14	9	11	8	10	8¼	7½	5¾	4¾	4	3⅛	2⅝	2¼
Price per lin ft. on lorry at works	8/6	7/11	10/4	9/7	13/1	12/–	17/6	15/10	19/5	17/6	20/8	22/4	29/2	36/3	39/8	51/3	63/11	70/9
" X " Class extra per ft.	11d.	11d.	1/1	1/1	1/1	1/1	1/5	1/5	1/8	1/9	2/–	2/4	2/10	3/5	4/6	5/3	5/11	6/11
½ Pipes (semi-circles)...	5/8	5/3				7/11				11/7								

EXCAVATOR

SOLID OR CUBIC MEASURE.

1,728 cubic inches	...	...	...	...	=	1 cubic foot
27 cubic feet	...	...	...	...	=	1 cub. yard

MEASUREMENT OF EARTHWORK.

In the measurement of cuttings and embankments with slopes, the common system of average heights gives less, and the common system of average areas gives more than the true contents ; the proper system is by the *prismoidal formula*, from which the annexed table for the measurement of earthwork is calculated, but even in this case the cross section is presumed to be perfectly level, the slopes to be quite true, and the change from chain to chain regular and gradual, otherwise the measurement is incorrect.

PRISMOIDAL FORMULA OF MEAN AREAS.

This consists of ascertaining the average area of excavation and multiplying by the length or depth to be excavated.

Let A = Area in sq. feet of face at one end of Cutting.
,, B = Area in sq. feet of face at other end of Cutting.
,, M = Area in sq. feet of face at Middle of Cutting.
,, L = Length or depth of cutting in feet.

Then $\frac{A + B + 4M}{6}$ = Average Area in Square Feet.

Then $\frac{A + B + 4M}{6} \times L$ = Contents in cubic feet.

Divide by 27 for Content in cubic yards.

CONSTANTS FOR ESTIMATING.

Prismoidal Formula.—Average area equal to four times the middle area added to the sum of the end areas and divided by six. In using the following constants instead of dividing the sum of the areas by six, multiply them by the following constants for the length required in chains :—22 yds. or 66 ft. = 1 chain.

Cuttings and Embankments.

Sum of areas in feet multiplied by	0·204	—cubic yards in	½	chain
,, ,, ,,	0·408	,, ,,	1	,,
,, ,, ,,	0·612	,, ,,	1½	,,
,, ,, ,,	0·815	,, ,,	2	,,
,, ,, ,,	1·223	,, ,,	3	,,
,, ,, ,,	1·630	,, ,,	4	,,
,, ,, ,,	2·037	,, ,,	5	,,
,, ,, ,,	2·445	,, ,,	6	,,

The ends of the cuttings on sidelong ground always form a pyramid, for which multiply the area of the base by one-third the length.

In light or shallow cuttings and embankments for railways, roads or tramways, the common average area will be sufficiently near for tendering, as it gives an excess in measurement in proportion to the inequalities of the heights.

TO MEASURE EXCAVATED TANK.

To ascertain the contents of a tank with sloping sides, add the superficial area in feet at the top to that at the bottom, and four times half-way down batter. Divide by 6 and multiply by the depth; result = the cubic contents in feet, multiply this by $6\frac{1}{4}$ to find the number of gallons tank would hold.

WEIGHT OF EARTHS AND ROCKS—SOLID.

Per Cubic Yard.

		cwt.			cwt.
1 cub. yd.	Earth weighs	26	1 cub. yd.	Sandstone weights	36
1 ,,	Sand weighs	30	1 ,,	Marl, Clay or Shale	38
1 ,,	Ironstone Gravel	36	1 ,,	Quartz	41
1 ,,	Quartz Gravel	30	1 ,,	Trachyte	43
1 ,,	Clay	31	1 ,,	Granite	43
1 ,,	Mud, wet	35	1 ,,	Slate	44
1 ,,	Ashes	10	1 ,,	Coarse Aggregate	30

An ordinary tip cart, empty, weighs 10 cwt., and holds about 23 cubic feet loose shale, or 12 cubic feet in the solid; thus taking $2\frac{1}{4}$ loads to the cubic yard in the solid; usual filling about 5 loads to 2 cubic yards solid. Ten navvy barrow loads to the cubic yard.

INCREASE IN VOLUME OF EXCAVATED MATERIALS.

Loose Earth	10%	Loam	75%
Sand	10%	Gravel	75%
Moderately Compact Soil	15%	Conglomerate	75%
Close Compact Soil	25%	Randstone	80%
Hard Clay	75%	Shale and Rock	100%

THE NATURAL ANGLE OF REST FOR MATERIAL EXCAVATED.

Dry Sand, Sheltered	22 degrees	Clay	45 degrees
Wet Sand	38 ,,	Rubble or Mine Tips	45 ,,
Earth or Soil	30 ,,	River Shingle	40 ,,

GRADIENTS AND ANGLES OF INCLINATION.

Gradient	Angle with horizon	Vertical rise in feet for mile	Gradient	Angle with horizon	Vertical Rise in feet per mile
1 in 1	45° 0′	5280	1 in 20	2° 51′	264
1 in 2	26° 33′	2640	1 in 30	1° 54½′	176
1 in 3	18° 27′	1760	1 in 40	1° 26′	132
1 in 4	14° 12′	1320	1 in 50	1° 8′	105½
1 in 5	11° 18½′	1056	1 in 60	0° 57′	88
1 in 6	9° 27′	880	1 in 70	0° 49′	75½
1 in 7	8° 8′	754	1 in 80	0° 43′	66
1 in 8	7° 7½′	640	1 in 90	0° 38′	59
1 in 9	6° 20′	587	1 in 100	0° 34′	53
1 in 10	5° 43′	528	1 in 120	0° 29′	44

NUMBER OF CUBIC YARDS IN FOUNDATION TRENCHES, CONCRETE, OR EXCAVATED WORK FOR EVERY FOOT DEEP.

Results in Cubic Yards and Decimals.

Length Trench.	WIDTH OF TRENCH.														
	inches.				feet.										
ft.	12	15	18	21	2	2½	3	3½	4	5	6	7	8	9	10
6	·2	·2	·3	·3	·4	·5	·7	·8	·9	1·1	1·3	1·5	1·7	2·	2·2
7	·2	·3	·4	·4	·5	·6	·8	·9	1·	1·3	1·5	1·8	2·	2·4	2·6
8	·3	·3	·4	·5	·6	·7	·9	1·	1·2	1·5	1·8	2·	2·4	2·6	3·
9	·3	·4	·5	·6	·7	·8	1·	1·2	1·3	1·6	2·	2·4	2·6	3·	3·4
10	·3	·4	·5	·6	·7	·9	1·1	1·3	1·5	1·8	2·2	2·6	3·	3·4	3·7
11	·4	·5	·6	·7	·8	1·	1·2	1·4	1·6	2·	2·4	2·8	3·2	3·7	4·1
12	·4	·5	·6	·7	·9	1·1	1·3	1·5	1·8	2·2	2·6	3·	3·5	4·	4·4
13	·5	·6	·7	·8	1·	1·2	1·4	1·7	1·9	2·4	2·9	3·4	3·8	4·3	4·8
14	·5	·6	·7	·9	1·	1·3	1·5	1·8	2·	2·5	3·1	3·6	4·1	4·7	5·2
15	·5	·6	·8	·9	1·1	1·4	1·7	1·9	2·2	2·7	3·3	3·9	4·4	5·	5·5
16	·6	·7	·9	1·	1·2	1·5	1·8	2·	2·3	2·9	3·5	4·1	4·7	5·3	5·9
17	·6	·7	·9	1·1	11·3	1·6	1·9	2·2	2·5	3·1	3·8	4·4	5·	5·7	6·3
18	·6	·8	1·	1·1	11·3	1·6	2·	2·3	2·6	3·3	4·	4·6	5·3	6·	6·6
19	·7	·8	1·	1·2	1·4	1·7	2·1	2·4	2·8	3·5	4·2	4·9	5·6	6·3	7·
20	·7	·9	1·1	1·3	1·5	1·8	2·2	2·6	2·9	3·7	4·4	5·2	5·9	6·6	7·4
21	·7	·9	1·1	1·3	1·5	1·9	2·3	2·6	3·1	3·9	4·5	5·3	6·2	7·	7·8
22	·8	1·	1·2	1·4	1·6	2·0	2·4	2·8	3·2	4·1	4·9	5·7	6·5	7·3	8·1
23	·8	1·	1·2	1·4	1·7	2·1	2·5	2·9	3·4	4·2	5·1	5·9	6·8	76·	8·5
24	·8	1·1	1·3	1·5	1·8	2·2	2·6	3·	3·5	4·4	5·2	6·1	7·1	8·	8·8
25	·9	1·1	1·4	1·6	1·8	2·3	2·7	3·2	3·6	4·6	5·5	6·4	7·4	8·3	9·2
26	·9	1·2	1·5	1·6	1·9	2·4	2·9	3·3	3·8	4·8	5·8	6·7	7·7	8·6	9·6
27	1·	1·5	1·5	1·7	2·	2·5	3·	3·6	4·	5·	6·	7·	8·	9·	10·
28	1·0	1·0	1·5	1·8	2·1	2·5	3·1	3·6	4·1	5·1	6·2	7·3	8·3	9·3	10·3
29	1·0	1·3	1·6	1·8	2·1	2·6	3·2	3·7	4·3	5·3	6·4	7·5	8·5	9·6	10·7
30	1·1	1·3	1·8	1·9	2·2	2·7	3·4	3·8	4·4	5·5	6·6	7·7	8·8	10·	11·1
31	1·1	1·4	1·7	2·	2·3	2·8	3·4	4·	4·6	5·7	6·8	8·	9·2	10·3	11·5
32	1·1	1·4	1·7	2·	2·4	2·9	3·5	4·1	4·7	5·9	7·1	8·3	9·5	10·6	11·8
33	1·2	1·5	1·8	2·1	2·4	3·	3·6	4·2	4·9	6·1	7·3	8·5	9·8	11·	12·2
34	1·2	1·5	1·8	2·2	2·5	3·1	3·7	4·4	5·	6·3	7·5	8·8	10·1	11·4	12·6
35	1·3	1·6	1·9	2·2	2·6	3·2	3·9	4·5	5·1	6·5	7·8	9·	10·4	11·7	13·

NUMBER OF CUBIC YDS. IN FOUNDATION TRENCHES, &c.—*Contd.*

Results in Cubic Yards and Decimals.

Length Trench.	WIDTH OF TRENCH.														
	inches				feet.										
ft.	12	15	18	21	2	2½	3	3½	4	5	6	7	8	9	10
36	1·3	1·6	2·0	2·3	2·6	3·3	4·	4·6	5·3	6·6	8·	9·3	10·6	12·	13·3
37	1·3	1·7	2·	2·4	2·7	3·4	4·1	4·8	5·5	6·8	8·2	9·6	10·9	12·3	13·7
38	1·4	1·7	2·1	2·4	2·8	3·5	4·2	4·9	5·6	7·	8·4	9·8	11·2	12·6	14·
39	1·4	1·8	2·1	2·5	2·8	3·6	4·3	5·	5·8	7·2	8·6	10·	11·5	13·	14·4
40	1·4	1·8	2·2	2·5	2·9	3·7	4·4	5·1	5·9	7·4	8·8	10·3	11·8	13·3	14·8
41	1·5	1·9	2·2	2·6	3·	3·8	4·5	5·3	6·1	7·6	9·	10·6	12·1	13·6	15·2
42	1·5	1·9	2·3	2·7	3·1	3·9	4·6	5·4	6·2	7·7	9·3	10·8	12·4	14·	15·5
43	1·6	1·9	2·3	2·7	3·1	3·9	4·7	5·5	6·3	7·9	9·5	11·1	12·7	14·3	15·9
44	1·6	2·	2·4	2·8	3·2	4·	4·8	5·6	6·5	8·1	9·7	11·3	13·	14·6	16·2
45	1·6	2·1	2·5	2·9	3·3	4·1	4·9	5·8	6·7	8·3	9·9	11·6	13·3	15·	16·6
46	1·7	2·1	2·6	2·9	3·4	4·2	5·1	5·9	6·8	8·5	10·2	11·9	13·6	15·3	17·
47	1·7	2·1	2·6	3·0	3·4	4·3	5·2	6·0	7·0	8·7	10·4	12·1	13·9	15·6	17·4
48	1·8	2·2	2·7	3·1	3·5	4·5	5·3	6·2	7·1	8·9	10·6	12·4	14·2	16·	17·8
49	1·8	2·2	2·7	3·1	3·5	4·5	5·4	6·3	7·3	9·1	10·8	12·7	14·5	16·3	18·1
50	1·8	2·3	2·7	3·2	3·6	4·6	5·5	6·4	7·4	9·2	11·1	12·9	14·8	16·6	18·4
51	1·9	2·3	2·8	3·2	3·7	4·7	5·6	6·5	7·6	9·3	11·3	13·1	15·1	17·	18·8
52	1·9	2·4	2·8	3·3	3·8	4·8	5·7	6·7	7·7	9·6	11·5	13·4	15·4	17·3	19·2
53	1·9	2·4	2·9	3·4	3·9	4·9	5·9	6·8	7·9	9·8	11·7	13·7	15·7	17·6	19·6
54	2·	2·5	3·	3·5	4·	5·	6·	7·	8·	10·	12·	14·	16·	18·	20·
55	2·	2·5	3·	3·5	4·1	5·1	6·1	7·1	8·2	10·2	12·2	14·3	16·3	18·3	20·4
56	2·	2·6	3·1	3·6	4·1	5·2	6·2	7·2	8·3	10·4	12·4	14·5	16·6	18·6	20·7
57	2·1	2·6	3·2	3·7	4·2	5·3	6·3	7·4	8·5	10·6	12·6	14·8	16·9	19·	21·1
58	2·1	2·7	3·2	3·7	4·3	5·4	6·5	7·5	8·6	10·7	12·8	15·	17·1	19·3	21·5
59	2·2	2·7	3·2	3·8	4·3	5·5	6·5	7·6	8·8	10·9	13·	15·3	17·4	19·6	21·9
60	2·2	2·7	3·3	3·8	4·4	5·5	6·6	7·7	8·9	11·1	13·3	15·5	17·7	20·	22·2
61	2·3	2·8	3·3	3·9	4·5	5·6	6·7	7·9	9·1	11·3	13·5	15·8	18·	20·3	22·6
62	2·3	2·8	3·4	4·	4·6	5·7	6·9	8·	9·2	11·5	13·7	16·	18·3	20·6	22·9
63	2·3	2·9	3·5	4·	4·6	5·8	7·	8·1	9·3	11·6	13·9	16·3	18·6	21·	23·3
64	2·4	3·9	3·5	4·1	4·7	5·9	7·1	8·2	9·5	11·8	14·2	16·5	18·9	21·3	23·6
65	2·4	3·	3·6	4·2	4·8	6·	7·2	8·4	9·6	12·	14·4	16·8	19·2	21·6	24·
70	2·6	3·2	3·8	4·4	5·2	6·5	7·8	9·	10·2	13·1	15·6	18·	20·8	23·4	26·
80	2·8	3·6	4·4	5·	5·8	7·4	8·8	10·2	11·8	14·8	17·6	20·6	23·6	26·6	29·6
90	3·2	4·2	5·0	5·8	6·6	8·2	9·8	11·6	13·4	16·6	19·8	23·2	26·6	30·	33·2
100	3·6	4·6	5·4	6·4	7·2	9·2	11·	12·8	14·8	18·4	22·2	25·8	29·6	33·2	36·8
200	7·2	9·2	10·8	12·8	14·4	18·4	22·	25·6	29·6	36·8	44·4	51·6	59·2	66·4	73·6

In the following schedule of prices for different types of excavations a depth allowance must be added on to prices to obtain the correct price at different depths of excavation.

The depth allowance formula is $6\frac{1}{2}$ (D + 1) pence. D = the depth of excavation in feet.

Example of Application of Depth Allowance Formula.

A trench excavated in soil to a depth of 6 feet.

The depth allowance is then $6\frac{1}{2}$ x (6 + 1) pence = $6\frac{1}{2}$ x 7 pence = 3/9½.

Add this to schedule price 19/– = 22/9½ per cubic yard.

APPROXIMATE NETT COSTS—Per Cubic Yard.

Add " on cost " charges and profit.

Excavation in Trenches.

1.	In " soil "	Cu. Yd.	19/–
2.	In " rock "	,,	93/–
3.	In " rock " where use of explosives is prohibited	,,	102/–
4.	In " shale "	,,	32/–
5.	In " shale " where use of explosives is prohibited	,,	32/–

Excavation in Shaft.

6.	In " soil "	,,	38/–
7.	In " rock "	,,	156/–
8.	In " rock " where use of explosives is prohibited	,,	187/–
9.	In " shale "	,,	78/–
10.	In " shale " where use of explosives is prohibited	,,	93/–

Excavation in Tunnel.

11.	In " soil "	,,	78/–
12.	In " rock "	,,	156/–
13.	In " rock " where use of explosives is prohibited	,,	234/–
14.	In " shale "	,,	126/–
15.	In " shale " where use of explosives is prohibited	,,	140/–

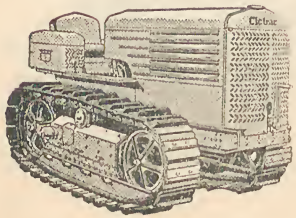
Cartage of spoil—add 1/3 per cu. yard for each ½ mile.

EARTH MOVING EQUIPMENT.

Oliver Crawler Tractors.

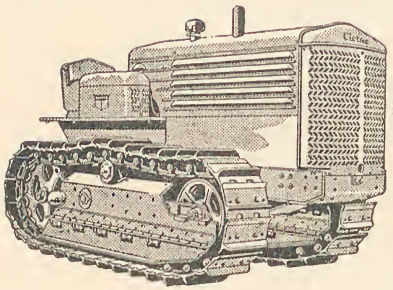
Widely used in industrial projects throughout Australia—in roadbuilding, tank sinking, open cut mining, logging, earthmoving, maintenance work—in combination with Britstand earthmoving and roadmaking equipment. There are four industrial models :

Oliver Model " BD " and " BDH " tractor.
(Diesel)



Drawbar h.p., 38·05.
Drawbar pounds pull in low gear, 8,012.
Belt h.p., 48.
4 speeds forward, 2 reverse.
Power pulley and power take-off if required.

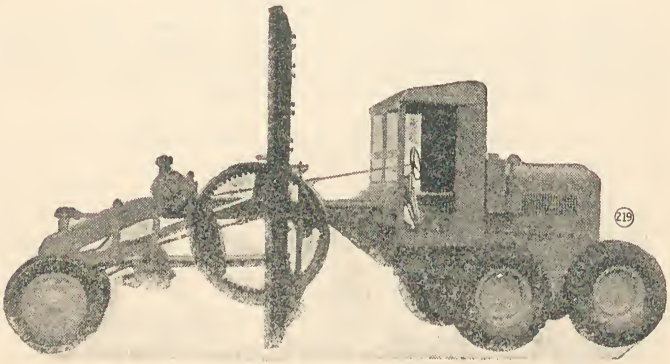
Oliver Model " DDH " Tractor.
(Diesel)



Drawbar h.p., 61·19.
Drawbar pounds pull in low gear, 11,816.
Belt h.p., 67·71.
4 speeds forward, 2 reverse.
Power pulley if required.
Air steering.

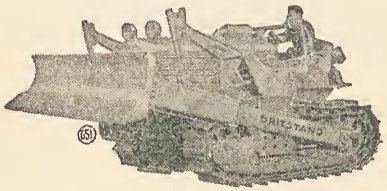
ROAD GRADING AND LEVELLING.

Modern Motor Grader : The " Britstand " Auto Patrol. 76 h.p. diesel engine ; tandem drive ; transmission with 8 speeds forward, 2 reverse ; 6-point power controls ; blade length 12 ft Weight of machine : 24,000 lbs.



Oliver "AD" with Britstand ¾ yd. Rotary Scoop keeps Bondi Beach (N.S.W.) flat and clean. Tractor shifts about 175 cu. yds. daily.





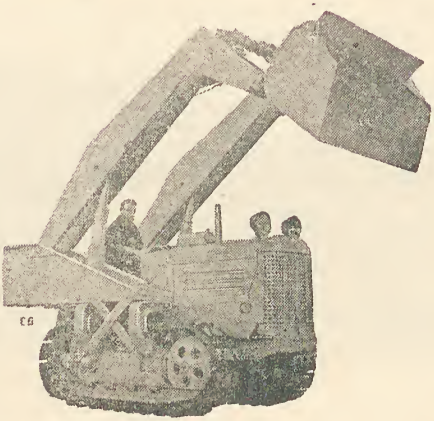
Tractor with Hydraulic Trailbuilder (Model "DDH" Oliver with Britstand equipment).

DATA ON BULLDOZERS, TRAILBUILDERS.

Bulldozers.	Tractor Models.				
	BD	BDH	DD	DDH	FDE
Blade length	76½″	84½″	84½″	97½″	120″
,, height	28″	28″	31″	31″	43″
Lift above ground ...	32″	32″	43″	43″	42″
Control	Hydraulic	Hydraulic	Hydraulic or Cable		Cable

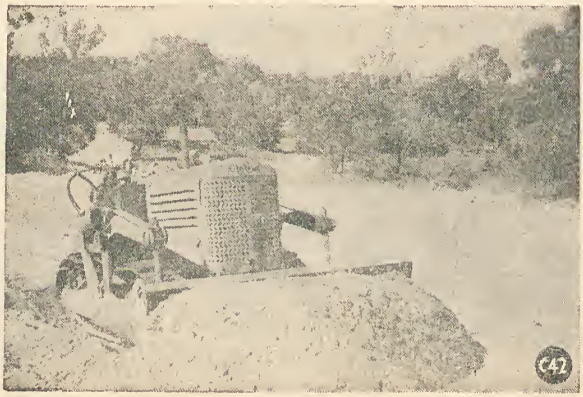
Trailbuilders.	BD	BDH	DD	DDH	FD-FDE
Blade length	94″	102″	107″	120″	150″
,, height	26″	26″	28″	28″	40″
Blade lift above ground	32″	32″	38″	38″	42″
Horiz. blade angle ...	0°–25°	0°–25°	0°–25°	0°–25°	0°–25°
Vertical blade tilt ...	0″–12″	0″–12″	0″–12″	0″–12″	0″–14″
Control	Hydraulic	Hydraulic	Hydraulic or Cable		Cable

Oliver-Britstand Front-End Loader.

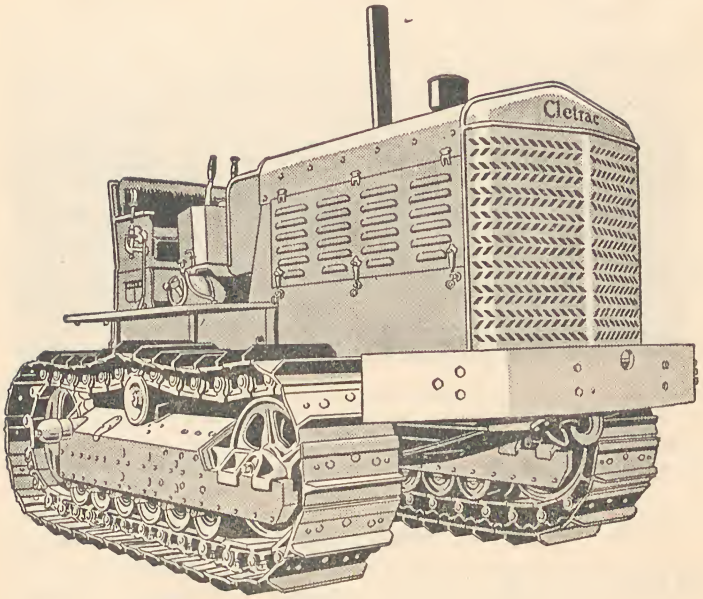


Roadmaking.—Grading, levelling by Nedlands (W.A.) Road Board's "BD" Oliver, Britstand equipped.

In approx. 3 weeks, 15,000 cu. yds. of sandhill was moved to make a new Marine Drive.



Oliver Model " FDE " Tractor.
(Diesel)



Drawbar h.p., 110.
Drawbar pounds pull in low gear, 26,800.
Belt h.p., 130.
4 speeds forward, 2 reverse.
Air steering; power pulley (if required).

INDUSTRIAL WHEELED TRACTOR.

Oliver " 900 " —Max. engine h.p., 63.
4-cyl., 1,200 r.p.m., $4\frac{3}{4}$ in. bore, $6\frac{1}{4}$ in. stroke. Fuel: Kero. (KD).
4 speeds forward, 1 reverse. Power pulley if required.

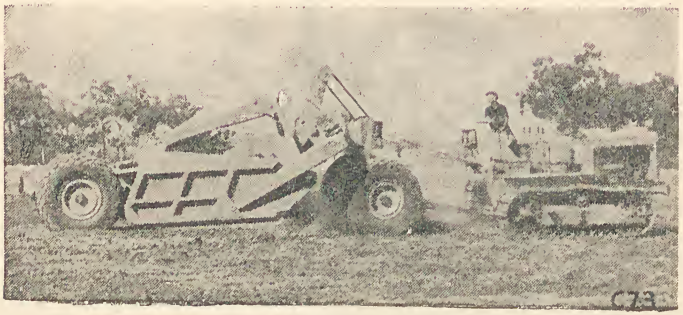
TANK SINKING.

Britstand cable scrapers, powered by Oliver tractors, are ideal for sinking tanks, from several thousand up to 60,000 and 65,000 cu. yd. capacities. Usual equipment for big tanks is tractor with scraper and ripper or rooter.

Recent jobs :—Several 33,000 yd. tanks at Clio (Q.), each 90 yds. square and 25 ft. deep, were constructed in 10–12 days (average), working 16–18 hour days with daily average 2,750 cu. yds. Equipment: tractor with 14 cu. yd. scraper, and ripper.

On tanks up to 5,000-10,000 yds., typical equipment is a " DDH " Oliver tractor with a Britstand Trailbuilder and a Hydraulic Scoop or Bottomless Scoop.

Tank Sinking Equipment.—Oliver " FDE " with Britstand C–14 Scraper scoops out 65,000 yd. tank.



SCOOP SIZES, WEIGHTS.—Here is useful data on " Britstand " **Scoops and Scrapers** :—

Type.	Model	Mouth ft.	Rated. Capacity. cu. ft.	Power, horses	Weight cwt.
Silt Scoop ...	51	5	34	6–8	8
,, ...	60	6	41	6–10	9
				drawbar h.p.	lbs.
Roto Scraper ...	4RS	4	12	15	650
Rotary Fresno ...	50	5	21	25	1100
,, ...	50H	5	27	35	1200
Rotary Wheel Scoops ...	45C/CP	4½	35	25–30	1750/1850
,, ...	5C/CP	5	42	35–40	1900/2000
			Cu. Yds.		
Hydraulic Scoops	HS31	4	3	35–40	4500
,, ...	HS51	4½	5	50–60	6400
Cable Scrapers ...	C6	6½	6	50–60	7800
,, ...	OC11	9	11	75–90	18000
,, ...	OC16	9½	16	90–110	24000
Plough ...	64R	——	——	2–4 horses	205 lbs.
,, ...	66R	——	——	2–8 ,,	285 ,,
,, ...	69	——	——	4–20 ,,	316 ,,
Grader-Ditcher...	No. 7	7 ft. blade		2–20 horses or tractor.	800 lbs.

(Prices of above equipment on application to the Distributors.)
See Oliver-Britstand advertisement, pages 48 and 49.

QUARRYING

In quarrying it is always considered advisable to obtain a vertical face to the quarry, the higher the better ; if the stone is detached at the ends with a natural cleavage, parallel with the face of the quarry, you will then be able to obtain an immense quantity of stone with a single hole. A block of freestone was detached from the face of a quarry at Sydney, about 150 feet long by 35 feet wide and 46 feet deep. A 5-inch hole was bored in the line of cleavage, about 75 feet from each end of the quarry, and 35 feet from its face, to the bed of the quarry, 46 feet in depth, into which was inserted 200 lbs. of blasting powder, filling up the lower 26 feet of the hole, the upper 20 feet tamped with dry clay. The mass, weighing about 15,000 tons, was moved forward about 18 inches, ready to be wedged and split up into blocks suitable for building. This hole was fired in three places by electricity, removing 75 tons of freestone for every lb. of powder exploded. By Sir F. Burgoyne's formulae for limestone, this would have required

$$353 = \frac{42{,}875}{32} = 1340\text{lbs.} \quad \left\{ \begin{array}{l} \text{the quantity actually used was nearer} \end{array} \right\} 35\tfrac{1}{2} = \frac{1225}{6} = 204\text{lbs.}$$

In opening a quarry there is always a loss of labour in removing surface soil from the top, or at the foot of the quarry, down to the natural bed, sometimes both ; also in getting a vertical face and open ends for a really effective or great blast, so that an ordinary quarry does not pay for the first two or three months.

MEASUREMENT.

Although the stones are always quarried larger than the net size required, the latter only is paid for. If the stones are bevelled or angular, the largest dimensions square with each other are reckoned. Soldier stones are building stones laid on the edge in contradistinction to stones laid on their natural bed as generally specified and carried out, but there are many exceptions to this rule because it has been found by actual experiment that some stones (where it is usual to set all building stones on their edge except cornices) are actually stronger on their edge than on their natural bed. The Sydney sandstone possesses similar properties. The bank at the corner of George and Hunter-streets, the pilasters, 18¼ feet in height by about 2 feet square ; also the stones forming the pilasters opposite the granite columns of the Sydney Post Office, about 12 feet high, are Soldier stones.

SANDSTONE QUARRYING.

In small local quarries, where the stone is quarried mainly for cottage foundations and general rubble work, blasting is used to remove the stone. The wastage of stone by this method is not particularly important for this work. In large well established quarries similar to the Hawkesbury quarries the stone is quarried in large blocks up to 30 tons in weight, by channelling machines. The blocks are channelled four sides and " humoured " with plug and wedges to free. The blocks are placed on a trolley and taken direct to saw, where it is sawn into slabs of the required dimensions. These slabs are then sent by

SANDSTONE QUARRYING.

rail to the stoneyard, where they are worked into the finished article.

The cost of sandstone is priced at per cubic foot with freight and cartage added at the prevailing rates.

It is advisable to obtain quotes for detailed work (see advt., page 71), but the following weights and approximate prices may serve as a guide for approximate costing.

WEIGHT OF SANDSTONE.

One cubic foot of sandstone weighs 140 lbs.
16 cubic feet of sandstone weigh 1 ton.

APPROXIMATE COSTS.

Block Stone : Ex quarry—8/- per cubic foot.
Quarry Sawing : 1/- per sq. ft. for each sawn face.
Labour content about ⅓ of cost.

CARTAGE RATES.

Sandstone Cartage—First mile 8/- per ton—6d. per cu. ft.
Each additional mile—3/- per ton—4½d. per cu. foot.
For Quotes see Advertisements, pages 36A and 71.

GYRATORY TYPE CRUSHERS.

Gyratory type crushers of the Pegson-Telsmith type are also manufactured and supplied by Hadfields Steel Works Limited, for primary, secondary and tertiary crushing units.

All machines are manufactured with a solid cast steel frame and are fitted with roller bearings throughout, lubricated by a self primed internal oil gear pump, thus ensuring that all bearings in the crushers are lubricated by forced feed.

Primary gyratory crushers can be supplied with capacities from 30 to 300 tons per hour and is an ideal machine for the reduction of pit waste in collieries or as a primary breaker in quarries.

The Pegson-Telsmith gyrasphere which has been especially designed as a secondary crusher is so designed to take a full choke feed, having a spring retained concave, permitting extremely fine settings without danger of breaking from tramp iron, or packing.

The production range of this unit is not limited to fine chippings, however; the gyrasphere can be equally successful on the larger sizes, crushing head being easily converted from " fines " to " standard."

These machines have a capacity from 15 tons to 210 tons per hour.

The " Intercone " Tertiary Crusher has been designed where the demand for chipping is not sufficiently large to warrant installation of a Pegson-Telsmith Gyrasphere but is also a high speed reduction crusher having a capacity of 15 tons to 68 tons per hour and is of similar construction to that of the Gyrasphere.

HADFIELD'S ROCK CRUSHERS (SPALLING).

These Jaw Crushers are designed for use in mines, cement works and large quarries, in conjunction with mechanical shovels and automatic feeders, with crushing capacities up to 700 tons of rock per hour. The giant 60 in. x 48 in. crusher will crush rocks up to 4 tons in one piece.

The frames are manufactured from the best toughened cast steel to withstand the stresses to which these machines are subjected.

All crushers are fitted with spherical double row self aligning roller bearings manufactured in Double Toggle and Single Toggle types.

DOUBLE TOGGLE CRUSHERS.

The double toggle type is used for heavy duty crushing and is recommended where hard rocks such as granite, basalt, quartz, metalliferous ores, calcareous minerals, shale, etc., are to be crushed.

SINGLE TOGGLE CRUSHERS.

The single toggle or roll jaw type for light duty crushing is recommended for medium soft rocks such as limestone, sandstone, etc.

JAW CRUSHER—SINGLE AND DOUBLE TOGGLE.

The capacities are based on crushing blue metal with continuous and regular feeding.

Table to be used as approximate guide only.

Size	Capacities in Tons per Hour											
	¾″	1″	1½″	2¼″	2½″	3″	4″	5″	6″	7″	8″	10″
12″×8″	1–2	2–4	3–6	4–7	5–8							
16″×9½″	2–5	4–6	5–9	8–10	9–12							
20″×10″			7–13	14–18	16–22							
24″×13″ D.T. only			10–16	17–24	18–25							
24″×14″ S.T.			10–16	17–24	18–25							
24″×19″ D.T.				20–25	20–30	32–38						
30″×18″ D.T.				25–35	27–37	37–45	40–50	70				
36″×24″ D.T.							70	85	110	135	175	
42″×36″ D.T.								100	140	170	200	
48″×42″ D.T.								120	180	220	260	400
60″×48″ D.T.									235	325	460	700

HAMMER MILL.

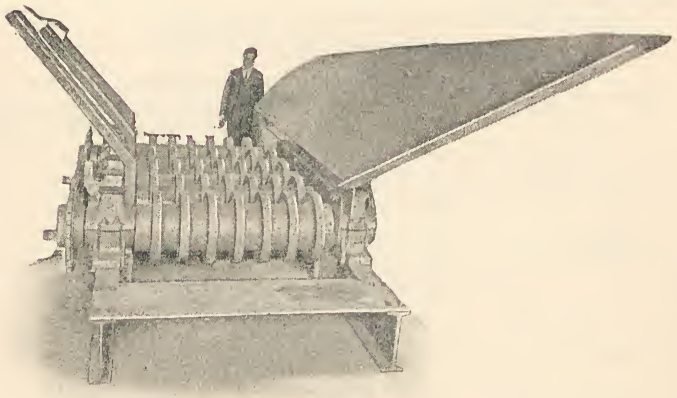
Suitable for crushing and pulverising medium, soft and dry materials such as shale, rock, gypsum, coal, etc., where a high percentage of fines is not objectionable. Most favoured in brick and cement works.

Size	Capacity in Tons per Hour.					
	Coal		Limestone			
	¼″	1¼″	½″	¾″	1½″	2″
14″ × 12″	25	38	9	11	13	15
20″ × 12″	37	48	12	15	20	26
18″ × 17″	45	60	30	44	50	57
24″ × 17″	70	90	45	65	75	85
30″ × 17″	90	125	56	80	92	104
40″ × 17″	120	160	72	104	120	142
48″ × 26″	140	200	86	118	150	190
60″ × 26″	175	250	108	150	195	250

Note : The above table gives data for general use.

MECHANICAL FEEDERS FOR LARGE CRUSHERS.

Cataract Roll Feeder.



The Cataract Roll Feeder is most suitable for feeding large jaw crushers where it is desirable to remove " fines," clay and other foreign matter which may be undesirable, as in the construction of large water conservation dams, etc. The removal of the " fines " also relieves the crusher, and by this means, improves the capacity of the crushing plant.

VIBRATING SCREENS.

The Pegson-Telsmith type Vibrating Screen is also manufactured and supplied by Hadfields Steel Works Limited, to ensure that a full range of equipment for any use can be obtained readily in this country.

The Pegson-Telsmith is a heavy duty positive throw type vibrating screen specially designed for wet or dry screening of sand and gravel, crushed stone, ore, coal or coke. The Screen operates by classifying the products in descending order of size, that is to say, the largest sizes are discharged first from the machine whilst the smaller sizes pass forward for further classification. The capacity per square inch of screening area is therefore unusually large, since, as opposed to cylindrical or flat screens, the finer meshes are not encumbered by the larger materials, and consequently are not subjected to excessive wear and tear through the passage of large materials. For obtaining a large output of dust-free material, accurately graded, Pegson Vibrating Screens are unequalled.

The Pegson-Telsmith is made in a wide range of sizes to suit any duty or tonnage and can be supplied with single, double or triple decks. The standard type is fitted with an overhead mechanism which gives an easily replaceable unit but an under-slung mechanism can also be supplied where the top deck would be required to handle large sized material.

The use of Pegson Screens is not limited to their incorporation in completely new Plants, but since the Screens occupy a minimum of space, they can generally be housed in an existing Plant with but little alteration to its layout.

The most important feature of any Vibrating Screen is the Vibrating Unit and no expense has been spared in the Pegson Screen to make this the best four-bearing Unit that money can buy.

The tapered roller bearings which take care of both radial and thrust loads are large in diameter, fully protected against the entrance of dust or moisture and are mounted on flexible rubber pads so that a minimum of vibration shall be transmitted to the supporting frame. Fly Wheels with adjustable counter-weights allow accurate balancing under any working conditions and the Vibrating Unit itself is not only easily accessible for maintenance and repair, but the complete Vibrator Unit can be removed and replaced within a remarkably short period. Nests of Springs carry the entire weight of the Vibrating Screen Frame, the Unit and the Screen Cloth Frames, thus relieving the bearings of all load except the aggregate to be handled. Adjusting screws are provided for quickly and easily altering the screening angle and unlike most Vibrating Screens the main stationary frame is horizontal, consequently more rigid and much more easily and conveniently installed. It is usually supported from below, but suspension fittings, including cables and springs, can be furnished when desired.

For further information, see advertisement, page 62.

BLASTING AND EXPLOSIVES

EXPLOSIVES AND USE OF SAME.

The firing of a shot causes the liberation of gases by heat, shock, sparks or other means, converting solids or liquids instantaneously into large volumes of gas. This increased volume exerts both a blow and pressure on the material being blasted. The pressure acts equally in all directions but the gas tends to escape through the path of least resistance. Most explosives act in exactly the same manner and therefore no matter what explosive is used, loading and tamping must be done very carefully in order to confine the gas, so that it will be forced to work upon the material to be blasted.

The user of explosives has to consider the choice of explosive, methods of preparing boreholes, and methods of loading and firing. In making a choice of explosives, the following types are available :—

1. Low Explosive or Blasting Powder.
2. High Explosive such as Gelignites, Quarry Monobel and Dynamites.

1. Blasting Powder is the slowest acting of all explosives. It has a heaving and pushing action and is used mainly for obtaining dimension stone. It is not water resisting and cannot be used under damp conditions, must be carefully loaded and well tamped as the slightest avenue of escape for the gases will diminish the effects of the blast. About 30% the power of Blasting Gelatine which is 100%.

HIGH EXPLOSIVES.

The range of grades in this class are, for purposes of description, divided into three sections :—Gelatines, Non-Gelatines and Permitteds.

GELATINES.

Gelatines have the advantages of plasticity, high density and water-resistance. They may be compressed into the borehole, reducing the air space to a minimum, while the high density concentrates the explosive, enabling the maximum efficiency from the explosion.

(a) High Explosives include all Nitroglycerine explosives. These are all detonating explosives fired by shock from an intermediate device called a detonator. The explosive is transformed from the solid to the gaseous state more rapidly than in the case of Black Powder and the volume of gas produced is much greater. In selecting High Explosives for certain work many factors must be taken into consideration, and some of the principal characteristics are strength, velocity or shattering effect and resistance to water. High Explosives Strengths are in the following order.

Blasting Gelatine 100% Strength.—The most powerful of commercial blasting explosives ; suitable for the hardest rock and ideal for submarine work.

Ammonium Nitrate Gelatine Dynamite—A.N.G.D. " 75 ".—Suitable for hard rock, metal breaking, or breaking boulders by " plastering,"

Sodium Nitrate Gelatine Dynamite S.N.G.D. 75% Nitro-Glycerine.—Sodium Nitrate explosives are very good in wet work.

A.N. Gelignite " 60 ".—Good in wet work.

S.N. Gelignite 60%.—Very good in wet work.

A.N. Gelignite " 50 ".—A good general purpose explosive. Will be found excellent in most rock work.

S.N. Gelignite 50%.—Very good in wet work.

All are fired with a detonator. Not less strength than No. 6.

NON-GELATINES.

Non-Gelatines are mostly of a granular nature. More susceptible to moisture than Gelatines. Where mild action is required they are suitable. These are also fired with a detonator not less strength than No. 6.

Owing to the granular nature of Non-Gelatines it is a common practice to use a gelignite primer in conjunction with the detonator. They are not good in wet holes.

Quarry Monobel.—Quarrywork, sub-soiling, Agricultural work.

A.N. Ligdyn " 40 ".—Quarrywork, sub-soiling, Agricultural work.

A.N. Ligdyn " 25 ".—Milder action explosive.

PERMITTEDS.

This group belongs to either the gelatines or non-gelatines, but, having passed special government tests, is permitted to be used in coal mines or places of a dusty or gaseous nature.

These tests are to ensure that no ignition of fire-damp or coal dust occurs.

Permitteds—Gelatinous Section—Ajax.
Non-Gelatinous Section.—Dynobel No. 2.

ELECTRIC SHOT FIRING.

Firing by electricity.—In firing holes simultaneously, a complete circuit must be made with the insulated wire, and wherever the wires are joined, the surfaces must be scraped clean with a pocket-knife.

Safety First.—The battery must be connected by the man who charges the holes. If any holes misfire, the battery must be disconnected before approaching site.

I have fired two 4-inch holes, containing 66 and 34 lbs. of blasting powder respectively. 80 yards from charge, removing 900 tons of Sydney freestone with Exploding Battery. I have also fired with success five holes along the cleavage simultaneously, the twin cable of holes being 30 yards only, and the three wires joining the five charges, about 11 yards each, removing 4000 tons sandstone at Pyrmont, Sydney.—C. E. Mayes.

The above 8 feet from the face, tight ends, but on good " pug " bed 4 inches thick.

The largest hole in centre of line, removing block 9 inches forward at centre straight out in the form of a V.

SAFETY FUSE.

Safety fuse is manufactured with an explosive that does not contain its own means of ignition and burns with a burning speed of 80 to 100 seconds per yard. It is advisable to calculate burning speed at 80 seconds a yard and then allow a good margin of safety.

DETONATORS.

All high explosives are fired by means of a detonator and No. 6 is the standard for use on all high explosives in Australia. They are manufactured in three forms, viz. :—Plain Detonator ; Electric Detonator ; Delayed Action Detonator.

The plain detonator, an aluminium or copper tube closed at one end, containing an explosive charge, is manufactured for use with safety fuse.

The Electric Detonator is similar, but is fitted with an electrical means of ignition. Manufactured in Low Tension types. The Low Tension type only is in common use in Australia and is used in single and multiple shot firing.

For submarine work a Submarine Electric Detonator is available and should always be used.

The Delay Action Fuse is manufactured so that the ignition of an electric matchhead is transmitted to the detonator, through a safety fuse, the length of which determines the period of delay.

Exploders.—These are used for generating the current for electrical firing, varying from Magneto types to Dynamo types ; manufactured with capacities of one to fifty shots.

Galvanometer.—The Galvanometer is a necessary equipment in Electrical Shot firing for testing the circuits before firing. Care should be taken that the instrument does not become faulty as sufficient current may be present to effect ignition.

When testing, the detonator should be placed in a place of safety.

Storage.

The storage of explosives should be in accordance with regulations ; dry, well ventilated and at an even temperature of 60° to 70° Fahrenheit.

Stocks should be used in rotation.

Particular care in storage and transport should be taken to keep explosives from the direct rays of the sun.

PREPARING A PRIMER.

Care should be taken in the preparation of a Primer, because on this depends the success of the shot.

Detonator and Safety fuse method.

1. Shake all sawdust carefully out of the Detonator. The sawdust should flow out freely and any specks should be tapped out gently on the palm of the hand. Do not use other methods.
2. Cut the fuse squarely across with clean fuse cutter. Always make a new, fresh, clean cut on fuse for insertion into the detonator.
3. Push the detonator on to the fuse until contact with fuse and composition is complete. Do not screw the fuse against the composition.
4. Crimp the detonator securely on to fuse with Detonator Nipper. In wet work make this joint waterproof with bituminous waterproofing paint.
5. Open the priming cartridge at one end, make a hole with fuse pliers or small stick and push detonator into the hole.
6. Tie the cartridge paper round the fuse.

The Primer for Electrical firing is similar to above, except that the cartridge paper is tied to the lead wires instead of the safety fuse.

CHARGING THE HOLE.

Clean out the hole and insert the cartridges one at a time, squeezing home gently with a wooden tamping rod.

Lower the Primer into hole until it rests against the charge. Do not tamp with earth or clay, pour or press a quantity lightly on the charge. When clear of the primer commence tamping and increase the pressure while adding earth or clay until the hole is filled.

The hole is ready to be fired if fuse is used to fire the charge.

Electric Firing.—In electric firing clean the lead wires and connect in series by connecting one wire from each detonator and connect it to the next detonator. Repeat this with all the detonators which leaves a remaining wire at the first and last detonators. These are connected to the main cable running to the firing position.

Before connecting to Exploder test circuit with a galvanometer. If the needle is deflected the circuit is complete.

" BULLING " A HOLE.

" Bulling " or enlarging a hole to take a larger quantity of explosives concentrated in a certain position, is done by exploding one, two or more charges at the bottom of the hole.

Before charging a " Bulled " hole make sure it has cooled sufficiently. Pour water in the Bulled hole to extinguish any burning fragments.

Misfires.

When a misfire occurs allow plenty of time before approaching the hole. Do not attempt to withdraw the charge but drill another hole a safe distance away parallel to it. Charge and fire and search debris for unexploded detonators and cartridges.

FIRING OF SHOTS.

The firing of a shot in connection with quarrying or mining breaks a quantity of rock, whose bulk is approximately proportional to the cube of the line of least resistance—that is, the shortest distance to the face of the rock.

The shortest distance from bore-hole to the face of the rock is usually called the Burden.

Depth of Bore Hole Required.

Generally the burden should be 0·4 to 0·6 times the depth of hole.

Formula for Determining Depth of Hole.

$\sqrt[3]{3} \times \text{Burden}^3$.

EXAMPLE :—Suppose the line of least resistance or Burden is 6 feet, then depth of hole would be as follows :—

$$\sqrt[3]{3 \times 6^3} = \sqrt[3]{3 \times 6 \times 6 \times 6} = \sqrt[3]{648} = 8{\cdot}65 \text{ feet depth.}$$

WEIGHT OF EXPLOSIVES USED IN SMALL BLASTS.

The co-efficient of quantity of each type of explosives varies in proportion to the strength of the explosive, therefore if we take gunpowder as unity and the coefficient of strength, as found by experiment, to be for powder 32, the other coefficients will be got from the following table.

Name of Explosive	Strength of Different Explosives taking Gunpowder as unity.	Specific gravity of explosives taking Gunpowder as as unity.	Value of C, being coefficient used for quantity of each explosive.
Gunpowder	1·00	1·00	32
Guncotton ...	2·84	1·06	90·9
Gelignite	2·94	1·65	94·1
Gelatine Dynamite...	3·54	1·59	113·3
Blasting Gelatin ...	4·09	1·60	130·9

Formula for weight of Explosives Used in Small Blasts.

For value of C, see table above.

Let E = the explosive used, in pounds ;
L = the line of least resistance in feet ; Burden.
C = a variable coefficient according to the explosive used ;

Then $E = \frac{L^3}{C}$

Example :—A shot of gunpowder in a blast with a burden of 6 feet.

Then $E = \frac{6^3}{32} = \frac{216}{32} = 6{\cdot}75$ lbs. gunpowder required.

Example :—A shot of gelignite with 9 ft. Burden.

$E = \frac{9^3}{94{\cdot}1} = \frac{729}{94{\cdot}1} = 7{\cdot}75$ lbs. gelignite required.

In many instances the line of least resistance is in the direction of the line of the borehole, and in this case the shot is not therefore taken as calculated to dislodge the whole of the rock from the face, but will lift the rock bodily, breaking out a hole somewhat in the shape of an inverted cone.

Attention is drawn to the fact that any specific problem in connection with the use of explosive can be referred to the manufacturers who no doubt would be willing to supply technical information regarding same.

Rules for Determining the Quantity of Explosive in Boreholes.

Cylindrical Inch Table.

One Cylindrical inch of			Gunpowder	weighs	·41885 ozs.
,,	,,	,,	Dynamite	,,	0·69 ,,
,,	,,	,,	Quarry Monobel ...	,,	0·4647 ,,
,,	,,	,,	A.N. Gel. Dynamite "75"	,,	·74635 ,,
,,	,,	,,	A.N. Gelignite "50" ...	,,	·62084 ,,
,,	,,	,,	50% Gelignite S.N. ...	,,	·64 ,,
,,	,,	,,	A.N. Lygdin "40" ...	,,	·63209 ,,
,,	,,	,,	Ajax	,,	·714 ,,
,,	,,	,,	Dynobel No. 2 ...	,,	·512 ,,

It is found that 1 lb. of gunpowder in a loose state occupies 38·2 cylindrical inches—that is, a borehole 1 in. in diameter and 38·2 in. deep; therefore the corresponding depths of other diameters vary inversely as the square of the diameter.

For example, say a borehole was 3 in. in diameter, and it was filled with dynamite to a depth of 4 in., then the quantity would be as follows:—1 cylindrical inch of dynamite weighs 0·69 oz.; therefore

$$3^2 \times 4 \times 0{\cdot}69 = 36 \times 0{\cdot}69 = 24{\cdot}84 \text{ oz.}$$

Formula for Determining Weight of Explosives in Boreholes.

For value of N, see table above.

Let a = The diameter of the bore, in inches;
d = The depth of the hole filled with explosive, in inches;
N = The weight of a cylindrical inch of explosive, in ounces;
W = The total weight, in ounces;
L = The weight, in pounds.

$$W = (a^2 \times d \times N) — L = \frac{(a^2 \times d \times N)}{16}$$

HOLE PLACEMENT, ETC., FOR ROCK BLASTING—USING A.N. GELIGNITE "50".

Minimum Finishing Diameter Inches.	Depth of Hole Feet.	Burden Ft.	Burden In.	Ratio Burden Depth.	Spacing Ft.	Spacing In.	Cubic Yards per Hole.	Tons per Hole.	Charge per Hole.	Ratio Tons. Lb.	Tons per Ft. of Drilling
1	3	2	0	0·67	3	0	0·67	1·34	6 ozs.	3·57	0·44
1	4	3	0	0·75	4	0	1·78	3·56	1 lb.	3·56	1·0
1	5	3	6	0·70	4	6	2·9	5·8	1½ lbs.	3·86	1·1
1⅛	6	4	0	0·67	5	0	4·45	8·9	1⅞ ,,	5·1	1·5
1⅜	8	5	0	0·625	6	0	8·9	17·8	3½ ,,	5·1	2·2
1⅜	10	5	0	0·5	6	0	11·1	22·2	4 ,,	5·5	2·2
1¼	12	6	0	0·5	8	0	21·4	42·8	8 ,,	5·3	3·5
2¼	20	10	0	0·5	10	0	74·0	148·0	25 ,,	5·9	7·4
3	30	15	0	0·5	12	0	200·0	400·0	65 ,,	6·1	13·3

The experiments that Nobel and Abel have conducted show that the explosion of gunpowder produces about 57 per cent. of solid matter and 43 per cent. of permanent gases, consisting of carbonic acid, carbonic oxide, nitrogen, sulphuretted hydrogen, and carburetted hydrogen; whilst the solid products are sulphate, hyposulphite, sulphide, and carbonate of potassium. These solids, at the moment of explosion, become converted into a fluid state, and occupy 0·6 of the space originally filled with powder; consequently the permanent gases occupy 0·4 of such space. These gases at a temperature of 32° Fahr. and at atmospheric pressure would occupy a space 280 times greater than that originally filled with powder; therefore the pressure exerted at the temperature of 32° $= \frac{280}{0{\cdot}4} \times 15 = 10{,}500$ lb. or 4·68 tons per square inch; but in the liberation of these gases a large amount of heat is generated, which enormously increases their tension. These experiments also show the temperature of the gases at the moment of explosion to be not less than 4,000° Fahr., which would increase their tension to 8·11 times greater than formerly given—namely $\frac{4{,}000}{32 + 461{\cdot}2} = 8{\cdot}11$; so that the total pressure of the gases will be $4{\cdot}68 \times 8{\cdot}11 = 37{\cdot}9$ tons pressure per square inch which the expansion of the gases is capable of producing.

S.N. 50% Gelignite develops a pressure of 132,300 lbs. per sq. in.

S.N. 60% Gelignite develops a pressure of 146,670 lbs. per sq. in.

COST OF DRILLING BY HAND JUMPER.—PER FOOT.

Basis—Labor, 5/- per hour.

Blasting Powder required for different sizes holes, &c.:—

Diam. of Hole. Inches.	Powder in 1 foot. Lbs.	Depth for 1 lb. Powder. Feet decimals.	Cost of Drilling, &c., per foot. By Hand Jumper. Shale.	Sandstone.	Bluestone
			s. d.	s. d.	s. d.
1½	0·71	1·41	2 6	3 0	5 8
2	1·26	0·80	3 0	3 8	7 0
2½	1·98	0·51	3 8	4 6	9 0
3	2·83	0·35	4 8	7 0	11 6
3½	3·85	0·26	5 8	7 6	13 6
4	5·03	0·20	6 4	9 0	15 6
4½	6·36	0·16	7 6	11 0	20 0
5	7·86	0·13	10 0	14 0	26 0
6	11·31	0·09	13 8	20 0	38 0

PRICE LIST.

Explosives—Per 50 Lb. Case.

Blasting Gelatine	134/6
Gelatine Dynamite S.N.	122/6
60 per cent. Gelignite S.N.	107/–
50 per cent. Gelignite S.N.	99/6
A.N. Gelatine Dynamite "75"	105/–
A.N. Gelignite "60"	93/–
A.N. Gelignite "50"	91/6
Ajax	90/6
Dynobel No. 2	86/–
Quarry Monobel	85/6
A.N. Ligdyn "40"	86/–
Semigel	90/–
PN/SN Blasting Powder	86/–

Safety Fuse

Per coil of 24 feet—Blue or white sump :

Case Lots	1/4
Broken Cases	1/6

Fuse Lighters.

2 minute, per 100	22/6
Multiple Fuse Igniters—Per 100	11/3
Detonating Fuse (Cordtex)—Per Foot	4d.
Detonators No. 6 per 1,000	119/–

Original cases of Detonators No. 6 contain 5,000 and 10,000. Broken case lots are subject to a repacking charge at rates as per the Government Explosives Department Schedule as under :—

Not exceeding 100	2/6
Not exceeding 1,000	6/–

Electric Detonators No. 6.

Length of Wires	Per 1,000 £ s. d.
54″	33 7 6
72″	35 7 6
84″	36 17 6
96″	38 12 6
120″	41 0 0
144″	43 15 0
240″	54 3 6

Electric Detonators are packed 1,000 to a case, except 54″ and 240″, which contain 2,000 and 750 respectively. Broken case lots are subject to a repacking charge at rates as per the Government Explosives Department Schedule as under :

Not exceeding 100	4 0
Over 100 but not exceeding 500	9 0
Over 500	10 0

ELECTRICAL

ELECTRICAL TERMS.

Current denotes the flow of electricity along a conductor.

Ampere is the unit of current measurement and means the rate of flow of electricity along a conductor. In practice the letter I is used to indicate current in amperes.

Electro Motive Force (E.M.F.) is an electrical pressure difference or force that moves or tends to move electricity to form a current along a conductor. The unit of E.M.F. is the volt.

Resistance is the property of a conductor by which it resists or opposes the passage of electricity. All conductors offer resistance.

The unit of resistance is the Ohm. In practice the letter R is used to indicate resistance in Ohms. One Ohm is that resistance which permits electricity to flow at the rate of one Ampere when the force causing the flow is one Volt.

The wire cable used mostly in electric light wiring of houses is 1/·044 Gauge and offers a resistance of one Ohm for every 183 feet of length.

For power points in house wiring the size most used is 1/·064 Gauge and offers a resistance of one Ohm for every 387 feet of cable.

Watt, or **Volt-Ampere,** signifies the value of output being amperes x volts. Unit for measuring power.

K.W. or **Kilowatt** = 1000 watts, 1000 watts = 1 unit. Unit is the gauge by which electricity is charged. 1 watt = 1 volt x 1 ampere. Board of Trade unit = 1000 watts for one hour.

Insulator.—All substances which resist the passage of electric current are termed insulators, such as glass, slate, marble, vulcanite, mica, indiarubber and porcelain.

Positive is signified by the sign plus and **Negative** by minus.

One Horse-power = 33,000 foot pounds per minute = 746 watts.

Brake Horse-power = the available H.P. at the pulley.

Electric H.P. (a rate of electrical performance) = 746 watts.

One KW = 1·34 British horse power.

R.P.M. revolutions per minute.

Prefix " **Milli** " = 1000 part. " **Micro** " = the millionth part.
" **Kilo** " = one thousand times. " **Meg** " = one million times.

A.C.—Alternating current—an abb. expressing a current having a periodical change in direction.

D.C.—Direct Current (also called Continuous Current), a current flowing in the same direction only.

Fuse.—An incombustible box containing a safety fuse.

Short Circuit.—A connection between two parts of a circuit which connection is of low resistance compared to the intercepted portion of a shunt or by-path.

Transformer.—Consists of primary wiring connected to A.C. source, with a secondary winding from which power is withdrawn at a different voltage.

Low Voltage.—Any voltage normally not exceeding 250 volts.

Medium Voltage.—Any voltage normally exceeding 250 volts and normally not exceeding 650 volts.

High Voltage.—Any voltage normally exceeding 650 volts.

EQUATIONS USED FOR CALCULATIONS.

For D.C. and A.C. Circuits containing a resistance only.

E = EMF in Volts—I = Current in Amperes—R = Resistance in Ohms.

Then $I = \frac{E}{R}$, $E = I \times R$, $R = \frac{E}{I}$

Example :—240 Volts (E) giving current 30 Amps (I)

Then Resistance $R = \frac{240}{30} = 8$ Ohms.

The resistance in a circuit is increased by increasing the length of wire cables in the circuit, and by Ohm's law, providing the voltage is constant, the current is decreased.

Example :— 183 ft. of 1/·044 gauge wire offers resistance of 1 Ohm.
1830 ft. of 1/·044 gauge wire offers resistance of 10 Ohms.

POWER—TRUE AND APPARENT.

The **apparent power** of A.C. circuits, Alternators, transformers and certain other A.C. machines are rated in Kilovolt Amperes (K.V.A.). Thus in a circuit the apparent power is the product of the Voltmeter reading and the Ammeter reading and is generally more than the true power.

$$\text{Apparent Power} = E \times I.$$

Example :—Voltmeter reading 240 Volts x Ammeter reading 30 Amp. = 7200 K.V.A. or apparent watts.

The **True Power** of an A.C. circuit is measured with a watt meter and is expressed in Watts and Kilowatts (100 watts).

Power Factor :—The Ratio between the "**apparent power**" and the "**true power**" is known as the **power factor** of that circuit.

$$\text{Power Factor (P.F.)} = \frac{\text{True Power}}{\text{Apparent Power.}}$$

$$\therefore \text{ True Power (T.P.)} = \text{Apparent Power x P.F.}$$

$$\text{Apparent Power (A.P.)} = \frac{\text{True Power}}{\text{P.F.}}$$

Example :—If a circuit is measured with Voltmeter and Ammeter and the reading is 30 Amps flowing at 240 Volts = 7200 K.V.A. or Watts (Apparent Power).

A Watt Meter connected to same circuit shows a reading of 5040 Watts (True Power).

Then Power Factor $= \frac{\text{T.P.}}{\text{A.P.}} = \frac{5040}{7200} = \cdot 70.$

To determine current in a 3 phase circuit :—

$$I = \frac{\text{Apparent Watts}}{1{\cdot}732 \times E} \text{ or } I = \frac{\text{True Watts}}{1{\cdot}732 \times E \times \text{P.F.}}$$

To determine Voltage in a 3 phase circuit :—

$$E = \frac{\text{Apparent Watts}}{1{\cdot}732 \times I} \text{ or } E = \frac{\text{True Watts}}{1{\cdot}732 \times I \times \text{P.F.}}$$

A Watt-Hour is the quantity of Electric energy used with a power rate of One Watt when this rate continues for one Hour.

Example :—A 100 Watt Lamp burning 10 hours uses 1000 watt hours or 1 kilowatt hour or 1 unit.

In electric light accounts 1 kilowatt hour is called a unit and is charged at pence per unit.

It must be remembered that the term Watts indicates consumption of Electricity.

One 100 Watt Lamp consumes $\frac{1}{10}$ of a unit in 1 hour.

Ten 100 watt lamps burning for 1 hour consume 1 unit of electricity.

POWER EQUATIONS FOR CALCULATIONS.

$$\text{Watts} = E \times I, \quad \text{Volts} = \frac{\text{Watts}}{\text{Amperes}}, \quad \text{Amps} = \frac{\text{Watts}}{\text{Volts}}$$

Power for Heating.—The following formula is used to give the wattage used in producing heat in a resistance unit or element.

$$\text{Watts} = I \times I \times R \text{ or } I^2R.$$

Example :—Current = 3 Amps., Resistance = 80 Ohms.
Then $3^2 \times 80 = 720$ Watts.

LIGHT—ILLUMINATION AND DIFFUSION.

Light.—The quantity of light reaching a surface is measured in **Lumens.**

The Foot-Candle is the illumination produced by one Lumen of light falling uniformly on one square foot of surface, and is the quantity produced by one standard British candle at a distance of one foot from surface.

Quality of Light.—High quality light is free from appreciable glare. The greater the diffusion the better the quality.

Diffusion.—Light is said to be diffused when it is reflected from a larger surface than the Electric lamp itself.

Illumination is measured in foot-candles, measured by a light meter. The quantity of Illumination required for different classes of work is calculated in foot-candles.

Angle of Cut Off is the extent to which light fittings screen the light source from view. It is the maximum angle below the horizontal at which the light source cannot be seen.

The minimum angle of cut off prescribed in most workshops and factories, by the Australian standard code, is 20 degrees.

Lamps 300 watts and over should have reflectors giving a 30° cut off, when mounted less than 20 feet from the floor.

A diffusing shade should not, if possible, be mounted less than 9 feet from floor. Care must be taken to choose the most efficient fittings, e.g., a 14″ diameter opal glass fitting, mounted 9 ft. from floor, using 150 watt light, would give approx. 700 Lumens per sq. foot. Using a 16″ diameter opal glass fitting a 200 watt lamp would be required for 700 Lumens per sq. foot.

One	100	Watt	Lamp	emits	1200 Lumens.
,,	150	,,	,,	,,	2030 ,,
,,	200	,,	,,	,,	2900 ,,
,,	300	,,	,,	,,	4700 ,,
,,	1000	,,	,,	,,	19100 ,,

COTTAGE LIGHTING AND POWER.

Method of Procedure.

Notify the supply authority to determine the point of attachment on cottage of Electricity Supply. This consists of two aerials attached to two shackle insulators.

This point of attachment is connected to the company's fuses by means of two 7/·036 V.I.R. cables, encased in $\frac{3}{4}$" screwed or B class conduit.

The end of conduit nearest the point of attachment must have a main's connection box, or provide rubber insulated and weatherproof cable of sufficient length to make the connection with adequate drip loops.

The consumer's conduit must finish within 2 feet of service lines. Generally the service fuses are supplied by the supply company. Drip Loops are supplied by the consumer to allow for connection to service fuses and meters.

The builder generally co-operates with the supply company as to the space allowed for fuses, meters and consumer's own switchboard.

A ready-made 3 circuit switchboard (2 circuits for light and 1 circuit for power) is usual for lights up to 12 with 3 power points on a 240 Volt supply.

MATERIALS REQUIRED FOR COTTAGE—CONDUIT ON SURFACE WHEN EARTH LEAKAGE CIRCUIT BREAKER IS NOT REQUIRED.

From Point of Attachment to Fuses :—

1 Mains Connection Box (2 way); Conduit, Bends and bush all to be $\frac{3}{4}$" screwed ; $\frac{3}{4}$" Earth Clip and Saddles ; $\frac{3}{4}$" x 6 wood screws ; 7/·029 Earth Wire—7/·036 V.I.R. cable. 3 Circuit switch board—Switch box or surrounds.

Wiring Internally :—Plain Conduit (screwed conduit in damp situations) Elbows, tees, couplings, junction boxes, saddles, earth clips and bushes, all to be $\frac{5}{8}$ inch.

Wood Screws $\frac{3}{4}$" x 6, 1" x 6, $1\frac{1}{2}$" x 10, 2" x 10.

Lights— 1/·044 V.I.R. cable—For 240 Volt Power Points 1/·064 or 3/·036 V.I.R. cable.

Wood Blocks, 3", 6" × 3" and 9" × 3"—2 Plate Ceiling Roses.

Fittings and Accessories :—Flexible $\frac{23}{\cdot 0076}$ cotton covered.

Cord grip lampholder, batten holders, lamps, shades—5 and 10 Amps. Single pole tumbler switches. 10 Amp. 3 pin plugs and bases—pilot lamps and guards.

Flush Type Switches :—Eliminate wood blocks and use Architrave switches and Flush switches.

Wall Boxes :—Single Gang, Spacers, 2 Gang and 3 Gang. 5 and 10 Amp Single pole flush switches. Three pin receptacles or switchboard combinations.

WHERE EARTH LEAKAGE CIRCUIT BREAKER IS REQUIRED.

To comply with the supply authority, allow for Earth leakage Circuit Breaker of the required number of circuits to take the place of switchboard.

Tough rubber sheathed cable is necessary for mains instead of the V.I.R. cable, plus the waterpipe as an electrode. Weather proof cable is used to comply with S.A.A. rules.

A good earth contact is necessary for the electrode, and where the building site is of a rocky or sandy nature, it is advisable to consult the supply authorities as to method used. Rock drilling or extra lengths of water pipe suitably arranged or buried may be necessary to obtain the minimum resistance between earth and electrode.

LIGHT AND POWER INSTALLATIONS FOR INDUSTRIAL BUILDINGS, FACTORIES, WORKS, FLATS AND LARGE HOMES.

It is not possible in these types of installations to estimate the cost at per point as in cottage or repetition work, but must be measured up and priced accordingly. A two, three or four wire service may be required.

Method of Procedure.

Notify the Supply Authorities of the electrical equipment proposed to install, viz.:—Lights, Power Points, Electric Range, Wash Boilers, type of Hot Water service, X-Ray Sets, Arc Welders, Heating processes, Motors, etc.

They will advise or determine the size and type of service to be installed with rates and type of metering.

The point of attachment having been determined by the Supply Authority, for, say, a 50 Amp 3 phase 4 wire supply, a position is selected for fuses and meters.

Where underground cables are used for the supply, a position inside the building is usually selected for fuses and meters.

The cable selected for this is 7/·064 V.I.R. as active and 7/·036 as a neutral cable, with 1¼″ conduit to enclose the cable.

Switch Board.—In the construction of the switch board it is necessary to consult the Supply Authority, who may require the water heating section, arc welding section and general lighting and heating in certain particular positions on the switchboard.

The general layout of a 3 phase switchboard consists of a triple pole switch, circuit breaker or earth leakage circuit breaker or magnetic contactor, as a main isolator from the electricity supply.

Determining the number of fuses and size of panel required to mount the fuses is a job for the electrician or switchboard manufacturer, but the following list of what is required may be of use.

Guiding List of Accessories.

1 Main Switch or Circuit breaker for Power.
1 Main Switch for light circuits.
1–240 Volt fuse for every 6 lights.
1–240 Volt fuse for every 3 power points.
1 switch fuse for hot water service.
2–500 Volt fuses for each Welding set.
3 Fuses for each 3 phase motor.
Neutral link or links to suit the supply

MAXIMUM NUMBER OF BRAIDED RUBBER INSULATED CABLES PERMITTED IN CONDUITS.

Size of Conductors	External Diameter of Conduit.													
	½ inch		⅝ inch		¾ inch		1 inch		1¼ inch		1½ inch		2 inch	
	Class		Class		Class		Class		Class		Class		Class	
	A. Plain	B. Screw'd	A. Plain	B. Screw'd	A. Plain	B. Screw'd	A. Plain	B. Screw'd	A. Plain	B. Screw'd	A. Plain	B. Screw'd	A. Plain	B. Screw'd
1/·044	3	2	5	4	7	6	12	10	20	16	30	26	50	46
1/·064	2	...	4	3	6	4	10	8	16	14	24	20	40	36
3/·029	2	...	4	3	7	5	12	10	20	16	30	26	50	46
3/·036	2	...	4	3	6	4	10	8	14	12	20	16	32	30
7/·029	1	...	2	2	4	4	8	6	12	10	16	14	24	22
7/·036	1	...	1	1	3	2	6	5	10	8	14	12	18	16
7/·044	1	...	1	1	2	1	4	4	7	7	8	7	12	10
7/·052	...	...	1	...	1	1	3	3	5	5	6	6	9	8
7/·064	...	...	1	...	1	1	2	2	4	4	6	6	9	8
19/·044	...	...	...	...	1	1	2	1	3	3	5	5	8	7
19/·052	...	...	...	...	1	1	1	1	3	3	5	4	8	6
19/·064	...	...	...	...	...	...	1	1	1	1	3	3	5	5
19/·072	...	...	...	...	...	...	1	1	1	1	2	2	4	4
19/·083	...	...	...	...	...	...	1	1	1	1	2	1	4	4

Notes.—Additional conductors may be inserted in all conduits above ⅜ in. size provided that all the conductors then enclosed can fit into a cylinder equal to the minimum size cylinder which the conductors specified in the table will fit without distortion.

For wires having radial dielectric thickness of 62 mils, take one size larger up to and including 7/·052″.

The external diameter is that by which the size of the conduit is known.

In the case of consumers' mains with the consent of the Supply Authority concerned two conductors may be inserted in ⅝ in. conduit.

C.M.A. WIRES, CABLES AND FLEXIBLES.

Subject to 26 per cent. Surcharge—Prices per 100 yards.

Nom. Area	Conductor	Carrying Capacity S.A.A. Rating	Approx. Circuit Length 1 Volt drop	V.R. Taped, Braided and Compounded						Red Lead Wth'proof		
				250-Volt Ref. No. 4101			660-Volt Ref. No. 5101			to 19/·064 250 Volt from 19/·072 660 volt.		
Sq. In.	Inch.	Amps.	ft.	£	s.	d.	£	s.	d.	£	s.	d.
·0015	1/·044	8	25		15	10	1	2	2	1	13	4
·002	3/·029	10	24	1	0	7	1	7	8	2	3	3
·003	1/·064	15	23	1	4	0	1	11	3	2	7	1
·003	3/·036	15	23	1	6	9	1	15	8	2	9	2
·0045	7/·029	20	25	1	15	2	2	5	4	3	0	1
·007	7/·036	30	26	2	5	3	2	14	10	3	15	2
·01	7/·044	35	34	3	7	10	4	0	9	4	12	10
·0145	7/·052	45	36	4	5	5	5	0	11	5	15	9
·0225	7/·064	55	45	5	12	5	6	13	0	7	11	8
·03	19/·044	65	49	7	3	8	8	13	9	10	6	10
·04	19/·052	75	59	9	10	7	10	16	6	12	18	2
·06	19/·064	100	67	12	19	11	14	10	7	17	6	9
·075	19/·072	115	73				17	12	11	21	19	5
·100	19/·083	140	80				22	11	7	27	6	6
·120	37/·064	155	82				27	3	9	32	7	1
·150	37/·072	180	85				32	15	4	38	11	7
·200	37/·083	220	86				41	19	1	47	19	7
·250	37/·093	255	85				50	11	3	57	1	1
·300	37/·103	285	84				59	14	7	76	19	10
·400	61/·093	345	79				81	3	5	104	6	1
·500	61/·103	395	72				96	2	2	120	0	8
·600	91/·093	460	63				117	2	10	150	14	0
·750	91/·103	550	54				138	16	7	177	15	2
·850	127/·093	600	50				158	19	1	201	15	9
1·000	127/·103	700	44				188	3	5	237	12	9

MAXIMUM SIZE ·06 sq. in. 19/·064 in.

Tough Rubber Sheathed Flexibles—250-Volt

Nom. Area	Conductor	Carrying Capacity	Twin			3-Core			4-Core		
Sq. In.	Inch	Amps.	£	s.	d.	£	s.	d.	£	s.	d.
·0010	23/·0076	5·0	3	15	7	4	16	1	5	13	11
·0017	40/·0076	7·5	4	6	10	5	11	9	6	17	3
·003	70/·0076	12·5	5	15	3	7	4	0	8	15	9
·0048	110/·0076	20·0	7	5	3	9	0	10	11	3	1
·007	162/·0076	25·0	9	16	8	12	4	2	15	3	7

TOUGH RUBBER SHEATHED CABLES.

Prices per 100 yards—Surcharge 26 per cent.

Nom. Area	Conductor	Carrying Capacity S.A.A. Rating	Approx. Circuit Length 1 Volt drop	Tough Rubber Sheathed V.R. Insulated—250-Volt		
				Single Core Ref. No. 4181	Twin Flat Ref. No. 4192	3-Core Flat Ref. No. 4193
Sq. In.	Inch.	Amps.	ft.	£ s. d.	£ s. d.	£ s. d.
·0015	1/·044	8	25	1 10 0	2 8 8	3 12 9
·002	3/·029	10	24	1 15 11	3 7 3	4 15 8
·003	1/·064	15	23	2 0 6	3 17 6	5 7 6
·003	3/·036	15	23	2 3 11	4 3 11	6 1 6
·0045	7/·029	20	25	2 14 2	5 4 8	7 11 3
·007	7/·036	30	26	3 7 11	6 12 9	9 11 6
·01	7/·044	35	34	4 9 11	9 2 10	13 6 3
·0145	7/·052	45	36	5 13 10	11 11 3	17 10 3
·0225	7/·064	55	45	7 14 8	16 5 1	22 17 11
·03	19/·044	65	49	10 11 8	21 15 11	—
·04	19/·052	75	59	13 6 7	28 12 7	—
·06	19/·064	100	67	17 16 5	39 3 2	—

LEAD ALLOY SHEATHED CABLES.

Prices per 100 yards—Subject to 38 per cent. surcharge.

Nom. Area	Conductor	Carrying Capacity S.A.A. Rating	Approx. Circuit Length 1 Volt drop	Lead Alloy Sheathed V.R. Insulated—250-Volt		
				Single Core Ref. No. 4121	Twin Flat Ref. No. 4132	3-Core Flat Ref. No. 4133
Sq. In.	Inch.	Amps.	ft.	£ s. d.	£ s. d.	£ s. d.
·0015	1/·044	8	25	2 1 0	3 3 11	5 3 8
·002	3/·029	10	24	2 10 0	4 0 3	6 9 8
·003	1/·064	15	23	2 13 7	4 8 9	7 4 3
·003	3/·036	15	23	2 17 7	4 17 7	7 16 5
·0045	7/·029	20	25	3 10 3	6 8 0	10 3 11
·007	7/·036	30	26	4 13 4	7 14 2	12 10 4
·01	7/·044	35	34	5 17 2	9 19 9	16 15 8
·0145	7/·052	45	36	7 12 2	13 0 2	20 13 10
·0225	7/·064	55	45	9 9 0	16 6 6	25 16 0
·03	19/·044	65	49	12 8 9	—	—
·04	19/·052	75	59	15 6 0	—	—
·06	19/·064	100	67	21 1 1	—	—

FLEXIBLES—PER 100 YARDS.

Subject to 26 per cent. surcharge and 8⅓% Sales Tax.

Art Silk and Glace Cotton Covered Flexibles—250-Volt.

Nom. Area	Conductor	Carrying Capacity	Twin Twisted	Twin Circular (Without Cotton Wormings)	3-Core Circular (Without Cotton Wormings)
Sq. In.	Inch	Amps.	£ s. d.	£ s. d.	£ s. d.
·0010	23/·0076	5·0	2 1 6	2 1 6	3 2 8
·0017	40/·0076	7·5	2 10 0	2 10 0	3 15 5
·003	70/·0076	12·5	3 4 7	3 4 7	4 17 7
·0048	110/·0076	20·0	4 3 8	4 3 8	5 10 4
·007	162/·0076	25·0	5 8 6	5 8 6	8 2 9

Resilient Tough Rubber Sheathed Flexible Cables—660-Volt

Nom. Area	Conductor	Twin Ref. No. 5382	3-Core Ref. No. 5383	4-Core Ref. No. 5384
Sq. In.	Inch	£ s. d.	£ s. d.	£ s. d.
·01	97/·012	23 6 5	28 18 7	37 6 0
·0145	60/·018	30 14 6	37 17 11	46 18 11
·0225	91/·018	41 8 2	52 16 11	64 5 8
·03	117/·018	49 18 8	63 10 9	76 18 4
·04	163/·018	61 14 11	79 16 8	98 13 5
·06	248/·018	79 10 8	104 13 0	133 14 6
·075	121/·029	89 17 0	120 1 0	150 4 11

Arc-Welding Flexible—T.R.S.

Conductor	Carrying Capacity	Single Core
Inch	Amps.	£ s. d.
770/·0076	150	16 4 8
1330/·0076	250	24 10 9
1680/·0076	400	29 18 10
2200/·0076	600	37 7 3
1105/·012	*	44 5 0
1358/·012	*	57 7 5

* These larger sizes of cables are intended for use when the voltage drop with the smaller cables becomes excessive.

Glace Cotton Flexibles—250-Volt (with Cotton Wormings)

Conductor	Twin Circular	3-Core Circular
Inch	£ s. d.	£ s. d.
23/·0076	2 8 8	3 10 0
40/·0076	2 18 5	4 4 3
70/·0076	3 15 4	5 9 3
110/·0076	4 16 0	7 0 5
162/·0076	6 14 3	9 3 1

Electrolier Wire—Ref. No. 3401

3/·020	Assorted Colours	15s. 4d.

See Advertisement, Inside Back Cover.

AUSTRALIAN CONDUIT—PER 100 FEET.

Type	⅝″ s. d.	¾″ s. d.	1″ s. d.	1¼″ s. d.	1½″ s. d.	2″ s. d.
Plain Black	16/5	22/10	33/8	58/9	73/–	96/4
Screwed Black	30/1	37/1	51/2	79/3	115/3	179/1
Flat Black	19/2	27/2	—	—	—	—
Plain Galvanized ...	30/1	38/7	55/6	85/–	110/1	139/8
Screwed Galv.	46/4	58/7	77/1	117/10	162/10	232/10
Flat Galvanized ...	30/7	42/–	—	—	—	—
Unpacked Flexible ...	52/9	67/7	87/–	132/–	150/–	187/9
Asbestos Packed Flex. ...	—	—	—	—	—	333/4

ENGLISH CONDUIT.

Plain Black	17/–	—	—	—	—	—
Screwed Black	—	—	—	—	150/–	247/–
Screwed Galv.	—	—	—	—	198/–	299/–

PLAIN CONDUIT FITTINGS—PER DOZEN.

Type.	⅝″ s. d.	¾″ s. d.	1″ s. d.	1¼″ s. d.	1½″ s. d.	2″ s. d.
Plain Black—F.G.S. :						
Couplings...	2/11	3/5	6/–	6/10	9/11	15/4
Elbows	3/4	4/–	9/6½	12/10	16/2	30/8
Reverse Elbows ...	4/10½	—	—	—	—	—
Tees	4/7	6/1	14/–	33/–	43/9	—
Plain Inspec.—F.G.S.:						
Elbows	5/9	7/2	22/11	—	—	—
Tees	7/8½	11/3½	23/4	—	—	—
Plain Inspection :						
Couplings	3/10½	3/6	—	—	—	—
Elbows	3/2½	3/10½	—	—	—	—
Tees	4/3½	5/0½	—	—	—	—
Junct'n Boxes–FGS.–Plain:						
1 Way—Enamel ...	12/5	12/10	24/–	—	—	—
Galvanized ...	13/9	14/9	26/2	—	—	—
2 Way—Enamel ...	13/5	14/4	27/8	—	—	—
Galvanized ...	15/1	16/6	30/–	—	—	—
3 Way—Enamel ...	14/6	15/6	29/–	—	—	—
Galvanized ...	16/2	17/5	35/–	—	—	—
4 Way—Enamel ...	15/10	16/8	31/4	—	—	—
Galvanized ...	17/6	18/7	37/2	—	—	—
Plain Galv.—F.G.S. :						
Tees	5/2	7/1	16/–	—	—	—
Elbows	3/10½	4/7	10/6	15/–	19/–	37/10
Couplings	3/5	3/11	6/9	7/8	11/3	17/10

"T. & S." BRAND—SCREWED CONDUIT FITTINGS—PER DOZEN.

Article	$\frac{5}{8}$"	$\frac{3}{4}$"	1"	$1\frac{1}{4}$"	$1\frac{1}{2}$"	2"
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Elbow—Scd.	5/11	7/2	12/2	20/8	32/4	61/3
Galv.	6/8	8/6	14/4	24/5	40/9	69/1
Inspt.—Scd.	10/–	13/2	16/9	22/7	34/5	64/2
Elbow—Galv.	10/10	14/3	18/3	26/6	40/9	73/7
Tee —Scd.	7/2	9/9	17/3	30/5	40/9	68/1
Galv.	8/6	12/2	20/8	35/3	46/1	81/4
Inspt.—Scd.	11/10	15/4	22/1	31/10	42/2	73/1
Tee —Galv.	13/4	16/9	24/7	38/9	47/6	82/4
Socket—Scd.	3/7	4/6	5/11	8/3	11/11	20/8
Galv.	4/–	5/–	7/5	8/9	15/2	22/7
Bend —Scd.	10/1	13/2	20/8	30/5	55/4	128/5
Female—Galv.	12/–	15/4	24/1	38/2	67/7	153/10
Backplate—Scd. ...	6/9	7/4	—	—	—	—
Galv. ...	7/8	7/8	—	—	—	—
Locknut—Scd.	2/–	2/2	2/5	3/9	5/5	7/3
Galv. ...	2/4	2/8	3/3	4/–	6/–	8/5

SCREWED JUNCTION BOXES—T. and S.—PER DOZEN.

Type	$\frac{5}{8}$" Inch.		$\frac{3}{4}$ Inch.		1 Inch.	
	Enamel	Galv.	Enamel	Galv.	Enamel	Galv.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1 Way ...	16/8	20/8	19/8	23/1	37/3	42/2
2 Way ...	17/8	20/8	19/8	23/1	37/3	42/2
3 Way ...	18/7	21/9	20/2	24/1	40/3	44/2
4 Way ...	19/8	24/1	20/8	25/6	45/1	49/6
Angle ...	17/8	20/9	19/9	23/1	—	—

EXAMPLE OF COSTS—MAINS—NON-EARTH LEAKAGE.

Cost for 25 feet run to Mains—Materials only.

Plain Black Conduit Installation.

	$\frac{3}{4}$"	1"	$1\frac{1}{4}$"
	s. d.	s. d.	s. d.
Plain Black Conduit	6 0	8 6	15 0
4 F.G.S. Insp. Elbows	2 6	7 9	4 6
1 Coupling	4	7	7
6 Saddles and Clouts	2	4	11
Earth Clip	2	2	3
Bush	2	2	2
Nett Cost	9 4	17 6	21 5
Add 20 per cent. Elec. Trade Allowance	1 11	3 6	4 4
Materials Cost	11 3	21 0	25 9

Costs for 25 Feet run to Mains—Materials only.
Screwed Black Conduit Installation.

	¾″	1″	1¼″
	s. d.	s. d.	s. d.
Screwed Black Conduit	9 6	13 0	20 0
4 Inspection Elbows	4 0	5 0	7 0
1 Screwed Coupling	5	6	8
Saddles and Clouts	2	3	11
Earth Clip	2	2	3
Bush	2	3	4
Nett Cost	14 5	19 2	29 2
Add 20 per cent. Trade Allowance ...	2 11	3 10	5 10
Materials Cost	17 4	23 0	35 0

Porcelain Mains Boxes—Including Trade Allowance.

2 Point	3 Point	4 Point
6 6	8 0	10 0

CABLES.

V.I.R. CABLES—COSTS.

Costs include 26 per cent. Surcharge and 20 per cent. Electricians Trade Allowance.

Cable	Per 100 Yds.	Per 24 Yds.	Per 34 Yds.	Per 45 Yds.
7/·036 ...	75/6	18/9	25/6	34/–
7/·044 ...	113/6	28/3	38/–	51/6
7/·052 ...	142/3	35/6	47/6	64/–
7/·064 ...	187/–	46/9	62/6	84/–

TOUGH RUBBER SHEATHED CABLES—COSTS.

Cable	Per 100 Yds.	Per 24 Yds.	Per 34 Yds.	Per 45 Yds.
7/·036 ...	113/3	28/6	38/–	51/3
7/·044 ...	150/–	37/6	50/–	67/6
7/·052 ...	189/6	47/3	63/–	85/6
7/·064 ...	258/–	64/6	86/–	116/–

HOME INSTALLATIONS—LIGHT AND POWER.

EXAMPLE A.

Approximate Cost—8 Light Points—Flush Switches.
Sub-Contractor's Estimate.
Without Switchboard and Mains Connection.

	£	s.	d.
120 ft. ⅝″ Plain Black Conduit at 16/– per 100 ft.	1	0	0
40 ft. ⅝″ Flat Black Conduit at 19/– per 100 ft.		7	6
15—⅝″ F.G.S. Inspection Tees at 8/– per doz.		10	0
16—⅝″ F.G.S. Inspection Elbows at 6/– per doz.		8	0
Saddles and Clouts			8
Bushes			3
160 Yds. 1/·044 V.I.R. Cable at 16/– per 100 Yds.	1	6	0
Add 26 per cent. Surcharge		7	0
8—Single Pole Architrave Switches at 24/– doz. ...		16	0
4—Batten Holders at 15/– doz.		5	0
5—Roses—Two Plate at 16/– doz.		6	8
5—C.G. Holders at 14/5 doz.		6	1
3 Yds. Twin Flex at 9d. Yd.		2	3
8—3″ Wood Blocks at 3/1 doz.		2	1
Screws		1	6
1 Lb. Earth Wire 7/·029 at 3/– Lb.		3	0
8—Lamps at 1/6		12	0
Nett Cost of Materials	6	14	0
Add 20 per cent. Trade Allowance	1	6	8
	8	0	8
Labour 26 Hours at 11/6	14	19	0
Cost = £2 18s. 4d. Per Point.—Nett Cost 8 Lights	£22	19	8

Connection to Main and Switchboard to be added separately.

EXAMPLE B.

Approximate Cost—8 Power Points in Cottage—Flush Switches.
Without Switchboard and wiring to main.
Sub-Contractor's Estimate.

	£	s.	d.
150 ft. ⅝″ Plain Black Conduit at 16/– per 100 ft.	1	4	0
25 ft. ⅝″ Flat Conduit at 19/– per 100 ft.		4	9
2—F.G.S. Inspection Tees at 8/– per doz.		1	4
18—⅝″ F.G.S. Inspection Elbows at 5/6 per doz.		8	3
4—⅝″ F.G.S. Inspection Couplings at 3/– per doz.		1	0
Saddles and Clouts		1	0
4—3 Way Junction Boxes at 15/6 doz.		5	2
12—B. & B. Connectors at 2/– each	1	4	0
8—C. Type Flush Boxes at 14/6 doz.		10	0
175 Yds. 1/·064 V.I.R. Cable at 24/– per 100 yds.	2	2	0
Add 26 per cent. Surcharge		12	0
4 lb. Earth Wire at 3/– Lb.		12	0
8—3 Pin Switch Plugs at 6/– each	2	8	0
Nett Cost of Materials	£9	13	6
Add 20 per cent. Trade Allowance	1	10	9
	£11	4	3
Labour 24 hours at 11/6	13	16	0
Cost = £3 2s. 6d. Per Point.—Nett Cost 8 Power Points ...	£25	0	3

Connection to Main and Switchboard to be added separately.

EXAMPLES C.

HINGED SWITCHBOARDS COMPLETE WITH PANEL.

Fixed—Labour and Materials.

Hinged Surround and Panel	Cost each	20% Allow. Added	Labour Fixing	Total Cost
	s. d.	s. d.	s. d.	s. d.
12″ x 8″ x ¼″ ...	15 8	18 10	10 0	28 10
12″ x 14″ x ¼″ ...	19 7	23 6	10 0	33 6
12″ x 18″ x ¼″ ...	23 0	27 8	12 0	39 8
12″ x 24″ x ⅜″ ...	33 8	40 5	12 0	52 5
18″ x 24″ x ⅜″ ...	41 3	49 6	14 0	63 6
18″ x 30″ x ⅜″ ...	46 4	55 8	15 0	70 8
24″ x 24″ x ⅜″ ...	52 10	63 5	15 0	78 5

SELF-CONTAINED HOUSE SERVICE SWITCHBOARDS.

	£	s.	d.
Single Circuit " B " & " H "—15 Amp. with Surround ...		12	0
Trade Allowance 20 per cent.		2	6
Labour and Sundries	1	7	0
Net Cost	£2	1	6
2 Circuit " B " & " H " with Surround	1	0	1
Trade Allowance 20 per cent.		4	0
Labour and Sundries	1	7	0
Net Cost	£2	11	1
3 Circuit " B " & " H " with surround	1	6	7
Add Trade Allowance and Tax		8	0
Labour and Sundries	1	8	0
Net Cost	£3	2	7
4 Circuit " B " & " H " with Surround	1	6	7
Add Trade Allowance and Tax		8	0
Labour and Sundries	1	8	0
Net Cost	£3	2	7

SWITCHES—MAINS.

	£	s.	d.
30 Amp. Double Pole Standard " A " Switch	1	3	0
Trade Allowance and Tax, 8½ per cent.		6	3
Labour and Sundries	1	8	0
Net Cost, Fixed	£2	17	3
60 Amp. Double Pole Standard " A " Switch	3	0	0
Trade Allowance and Tax 8½ per cent.		16	6
Labour and Sundries	1	8	0
Net Cost Fixed	£5	4	6
30 Amp. Triple Pole Standard " A " Switch	1	6	0
Trade Allowance and Tax		7	0
Labour and Sundries	1	8	0
Net Cost Fixed	£3	1	4
60 Amp. Triple Pole Standard " A " Switch	3	10	0
Trade Allowance and Tax		19	6
Labour and Sundries	1	8	0
Net Cost Fixed	£5	17	6

EXAMPLES D.

INSTALLATION ONLY OF DOMESTIC APPLIANCES NOT INCLUDING WIRING FROM SWITCHBOARD.

Electric Stove—With Switch and Pilot Lights.	£	s.	d.
1–15 Amp. D.P. S.A. Switch	1	15	0
Switch Block, 3/– ; Pilot Lamps, Guards, 6/– ; Sundries, 5/–		14	0
Materials	2	9	0
Labour 3 Hours at 11/6	1	14	6
Approximate Cost	£4	3	6

Electric Stove without switch allow £1 5s. 0d. installation.
Add Wiring from switchboard, 2/9 per foot extra.

Bath Heater—3 Phase and **Sinkheater**—3 Phase.	£	s.	d.
1–20 Amp. Triple Pole Push Button Switch	2	5	0
Labour and Sundries	2	7	6
Approx. Cost installing each	£4	12	6

Allow wiring from switchboard, 3/2 per foot extra.

Wash Boiler, Installation.
Allow approx. £1 10s. 0d. for installation.
Allow Wiring from switchboard, 2/9 per foot extra.

Off Peak Heater, installation.
Allow approx. £1 15s. 0d. for installation.
Allow wiring from switch board 2/4 per foot extra.

EXAMPLES E.

WIRING FROM SWITCHBOARD TO DOMESTIC APPLIANCES.

Cooking Range—2 Phase—40 ft. run from Switchboard.

	£	s.	d.
40 ft. ⅝″ Plain Conduit at 16/– per 100 ft.		6	6
8–⅝″ F.G.S. Insp. Elbows at 5½d. each		3	8
2 Couplings at 3d.			6
Saddles, Clouts, Earthclip, Bush			6
50 yds. 1/·064 V.I.R. Cable at 24/– per 100 yds. ...		12	0
Add 26 per cent. surcharge		3	2
¾ Lbs. Earth Wire		3	0
1 Yd. ⅝″ Flex Conduit at 1/9 Yd.		1	9
2 Flex. Conduit Couplings at 1/6 each		3	0
Materials	1	14	1
Add 20 per cent. Trade Allowance		6	10
Labour, 6 hours at 11/6	3	9	0
Cost = 2/9 per foot—Cost 40 ft. run	£5	9	11

Bath Heater—3 Phase, 18 Amps.—40 ft. run from switchboard.

	£	s.	d.
40 ft.–¾″ Plain Conduit at 22/3 per 100 ft.		9	0
11–¾″ Inspection Elbows at 7½d.		6	11
Saddles, Clouts, Earthclip and Bush			9
2 ft. ¾″ Flex Conduit at 9d.		1	6
50 Yds. 7/·029 V.I.R. Cable at 35/6 per 100 Yds. ...		17	9
Add 26 per cent. surcharge		4	9
⅔ lbs. Earth Wire		3	0
¾″ Flex. Con. Coupling, 1/2 ; Nipple, 4d. ; Coupling, 6d.		2	0
Materials	2	5	8
Add 20 per cent. Trade Allowance		9	1
Labour 6 hours at 11/6	3	9	0
Cost = 3/2 per foot—Cost 40 ft. run	£6	3	9

Sink Heater—3 Phase—40 ft. run from Switchboard.

	£	s.	d.
40 ft. ⅝″ Plain Conduit at 16/– per 100 ft.		6	6
11–⅝″ F.G.S. Insp. Elbows at 5½d. each		5	1
Saddles, Clouts, Earth Clip and Bush			9
2 ft. ⅝″ Flex Conduit at 9d. foot		1	6
50 yds. 1/·064 Cable at 24/– per 100 yds.		12	0
Add 26 per cent. surcharge		3	2
Earth Wire		3	0
⅝″ Flex Conduit Coupling, 1/2 ; Nipple, 4d. ; Coupling 6d.		2	0
Materials	1	14	0
Add 20 per cent. Trade Allowance		6	10
Labour 6 Hrs. at 11/6	3	9	0
Cost = 2/9 per foot—Cost 40 ft.	£5	9	10

Off Peak Heater—15 Amps.—Single Pole—40 ft. run from Switchboard.

	£	s.	d.
40 ft. ⅝" Plain Conduit at 16/– per 100 ft.		6	6
8 F.G.S. Insp. Elbows at 5½ d. each		3	8
F.G.S. Couplings			6
Saddles, Earth Clip, Bush			6
1 Yd. ⅝" Flex Conduit at 1/9 Yd.		1	9
35 Yds. 1/·064 V.I.R. Cable at 24/– per 100 Yds. ...		8	5
Add 26 per cent. surcharge		2	2
Earth Wire 1/·029		3	0
2 F.G.S. Flexible Couplings at 1/6		3	0
Materials	£1	9	6
Add 20 per cent. Trade Allowance		6	0
Labour, 5 hours, at 11/6	2	17	6
Cost = 2/4 per foot.—Approx. Cost 40 ft. run ...	£4	13	0

COST OF DOMESTIC INSTALLATIONS—NON EARTH LEAKAGE.

In estimating the costs of light and power installations to homes, the costs are summarized in the following pages, and are divided into the following items :—

No. 1. Installation of Service Main to Switchboard Per Foot.—Tables Nos. 1 and 2.

No. 2 Switchboard—Panel and Surround—Table No. 3.

No. 3. Number of Light Points—Table No. 4.

No. 4. Number of Power Points—Table No. 5.

No. 5. Installation of Appliances Table No. 6.

No. 6. Wiring to appliances at per foot—Table No. 7.

Examples of applying costs are shown and may be varied to suit specifications.

Where Earth Leakage System is required, the cost of earth leakage circuit breaker, wiring and electrode work to be added to cost.

TABLE OF COSTS NO. 1—INSTALLATION TO MAINS.

Switchboard not Included.

Contractors to add service to Electricians and Profit.
Plain Black Conduit—25 Feet Run to Mains.
Cables—V.I.R. and Tough Rubber Sheathed T.R.S.

Conduit & Fittings		Cables.		Mains Box	Labour		Total Cost	
Size	Cost	No. and Gauge	Cost		Per Foot	Per 25 Ft.	25 ft. Run	Per Foot
	s. d.		s. d.	s. d.	s. d.	£ s. d.	£ s. d.	s. d.
¾″	11 3	2–7/·036 V.I.R.	18 9	6 6	1 11	2 8 0	4 4 6	3 4½
¾″	11 3	,, ,, T.R.S.	28 6	6 6	1 11	2 8 0	4 14 3	3 9¼
¾″	11 3	2–7/·044 V.I.R.	28 3	6 6	1 11	2 8 0	4 14 0	3 9¼
¾″	11 3	,, ,, T.R.S.	37 6	6 6	1 11	2 8 0	5 3 3	4 1½
1″	21 0	2–7/·052 V.I.R.	35 6	6 6	2 0	2 10 0	5 13 0	4 6¼
1″	21 0	,, ,, T.R.S.	47 8	6 6	2 0	2 10 0	6 4 9	5 0
1″	21 0	2–7/·064 V.I.R.	46 9	6 6	2 0	2 10 0	6 4 3	4 11¾
1″	21 0	,, ,, T.R.S.	64 6	6 6	2 0	2 10 0	7 2 0	5 8
¾″	11 3	3–7/·036 V.I.R.	25 6	8 0	2 1	2 12 1	4 16 10	3 10½
1″	21 0	3–7/·036 T.R.S.	38 0	8 0	2 1	2 12 1	5 19 0	4 9
1″	21 0	3–7/·044 V.I.R.	38 0	8 0	2 1	2 12 1	5 19 0	4 9
1″	21 0	3–7/·044 T.R.S.	50 0	8 0	2 1	2 12 1	6 11 0	5 3
1″	21 0	3–7/·052 V.I.R.	47 6	8 0	2 1	2 12 1	6 8 6	5 2
1″	21 0	3–7/·052 T.R.S.	63 0	8 0	2 1	2 12 1	7 4 0	5 9
1¼″	25 9	3–7/·064 V.I.R.	62 6	8 0	2 6	3 2 6	7 18 9	6 4½
1¼″	25 9	3–7/·064 T.R.S.	86 0	8 0	2 6	3 2 6	9 2 0	7 4½
1″	21 0	4–7/·036 V.I.R.	34 0	10 0	2 4	2 18 4	6 3 4	4 11½
1″	21 0	4–7/·036 T.R.S.	51 3	10 0	2 4	2 18 4	7 0 7	5 7½
1″	21 0	4–7/·044 V.I.R.	51 6	10 0	2 4	2 18 4	7 0 10	5 7½
1″	21 0	4–7/·044 T.R.S.	67 6	10 0	2 4	2 18 4	7 16 10	6 3¼
1¼″	25 9	4–7/·052 V.I.R.	64 0	10 0	2 6	3 2 6	8 2 3	6 6
1¼″	25 9	4–7/·052 T.R.S.	85 6	10 0	2 6	3 2 6	9 3 9	7 4¼
1¼″	25 9	4–7/·064 V.I.R.	84 0	10 0	2 6	3 2 6	9 2 3	7 4
1¼″	25 9	4–7/·064 T.R.S.	116 0	10 0	2 6	3 2 6	10 14 3	8 7

TABLE OF COSTS No. 2—INSTALLATION TO MAINS.

Screwed Black Conduit—25 Feet Run to Mains.

Conduit and Fittings		Cables			Labour		Total Cost	
Size	Cost	No. and Gauge	Cost	Mains Box	Per Foot	Per 25 Ft.	25 Ft. Run	Per Foot
¾″	17 4	2–7/·036 V.I.R.	18 9	6 6	2 0	2 10 0	4 12 7	3 8½
¾″	17 4	2–7/·036 T.R.S.	28 6	6 6	2 0	2 10 0	5 2 4	4 1
1″	23 0	2–7/·044 V.I.R.	28 3	6 6	2 3	2 16 3	5 14 0	4 6¾
1″	23 0	2–7/·044 T.R.S.	37 6	6 6	2 3	2 16 3	6 3 3	4 11¼
1″	23 0	2–7/·052 V.I.R.	35 6	6 6	2 3	2 16 3	6 1 3	4 10¼
1″	23 0	2–7/·052 T.R.S.	47 3	6 6	2 3	2 16 3	6 13 0	5 4
1″	23 0	2–7/·064 V.I.R.	46 9	6 6	2 3	2 16 3	6 12 6	5 3¾
1″	23 0	2–7/·064 T.R.S.	64 6	6 6	2 3	2 16 3	7 10 3	6 0
1″	23 0	3–7/·036 V.I.R.	25 6	8 0	2 6	3 2 6	5 19 0	4 9
1″	23 0	3–7/·036 T.R.S.	38 0	8 0	2 6	3 2 6	6 11 6	5 3¼
1″	23 0	3–7/·044 V I.R.	38 0	8 8	2 6	3 2 6	6 11 6	5 3¼
1″	23 0	3–7/·044 T.R.S.	50 0	8 0	2 6	3 2 6	7 3 0	5 8¾
1″	23 0	3–7/·052 V.I.R.	47 6	8 0	2 6	3 2 6	7 0 6	5 7½
1″	23 0	3–7/·052 T R.S.	63 0	8 0	2 6	3 2 6	7 16 0	6 3
1¼″	35 0	3–7/·064 V.I.R.	62 6	8 0	2 8	3 6 8	8 12 2	6 10¾
1¼″	35 0	3–7/·064 T.R.S.	86 0	8 0	2 8	3 6 8	9 15 8	7 10
1″	23 0	4–7/·036 V.I.R.	34 0	10 0	2 7	3 4 7	6 11 7	5 3¼
1″	23 0	4–7/·036 T.R.S.	51 3	10 0	2 7	3 4 7	7 8 10	5 11½
1″	23 0	4–7/·044 V.I.R.	51 6	10 0	2 7	3 4 7	7 9 1	5 11½
1″	23 0	4–7/·044 T.R.S.	67 6	10 0	2 7	3 4 7	8 5 1	6 7¼
1¼″	35 0	4–7/·052 V.I.R.	64 0	10 0	2 10	3 10 10	9 0 0	7 2½
1¼″	35 0	4–7/·052 T.R.S.	85 6	10 0	2 10	3 10 10	10 1 6	8 0¾
1¼″	35 0	4–7/·064 V.I.R.	84 0	10 0	2 10	3 10 10	10 0 0	8 0
1¼″	35 0	4–7/·064 T.R.S.	116 0	10 0	2 10	3 10 10	11 12 0	9 3½

TABLE NO. 3—Summarized.

Approximate Costs Switchboard Gear—Labour and Materials.

" B " and " H " Switchboards—House Service.

		£	s.	d.
Single Circuit	each	2	1	6
Two ,, ...	,,	2	11	1
Three ,, ...	,,	3	2	7
Four ,, ...	,,	3	2	7

Switches—Mains.

		£	s.	d.
30 Amps. double pole switches	each	2	17	3
60 Amps. double pole switches	,,	5	4	6
30 Amps. triple pole switches	,,	3	1	4
60 Amps. triple pole switches	,,	5	17	6

Fuses.

		£	s.	d.
20 Amp. 250 volt fuses	each		6	0
20 Amp. 500 volt fuses	,,		8	6
30 Amp. 500 volt fuses	,,		10	0

Links.

		£	s.	d.
4, 5 and 6 hole	each		8	6
7, 8 and 10 hole	,,		10	0

SUMMARY OF COSTS—FOR ESTIMATING.

Domestic Installations—Non Earth Leakage.

TABLE NO. 4.

Installation of Light Points—£2 18s. 4d. per Point.

TABLE NO. 5.

Installation of Power Points, £3 2s. 6d. per point.

TABLE NO. 6.

Installation only of Domestic Appliances.

	£	s.	d.
Electric Stove—2 Phase—with switch and Pilot lights ...	4	0	6
Electric Stove—2 Phase—without switch	1	5	0
Bath Heater	4	12	6
Sink Heater	4	12	6
Wash Boiler	1	10	0
Off Peak Heater	1	15	0

TABLE NO. 7.

Wiring to Applicances—Switchboard to Appliance.

Electric Stove—2 Phase	2/9 per foot
Bath Heater	3/2 ,, ,,
Sink Heater	2/9 ,, ,,
Wash Boiler	2/9 ,, ,,
Off Peak Heater	2/4 ,, ,,

EXAMPLE OF COST NO. 1—NON EARTH LEAKAGE.
A Cottage—10 Lights—4 Power Points—20 ft. run to Main.

	£	s.	d.
Table No. 1—20 ft. Main—¾″ Conduit—2/7·036 Cable at 3/4½ ft.	3	7	6
Table No. 3—2 Circuit " B " & " H " switch board at 51/1 each	2	11	1
Table No. 4—10 Light Points at 58/4 each	29	3	4
Table No. 5—4 Power Points at 62/6 each	12	10	0
Cost = £3 8s. 0d. per point.—Net. Cost	£47	11	11

Builder to add service and profit.

EXAMPLE NO. 2—NON EARTH LEAKAGE.
Home—12 Lights—6 Power Points—Electric Stove—Wash Boiler. Off Peak Heater—25 ft. run to Main.

Switchboard.	£	s.	d.
Table No. 1—25 ft. Main—¾″ Conduit—3/7·036 V.I.R. Cable at 3/10½	4	16	11
Table No. 3—30 Amp. Double Pole Main Switch at 57/3 ...	2	17	3
Table No. 3—Off Peak S.C. Switchboard at 41/6	2	1	6
Table No. 3—6 fuses at 6/-	1	16	0
Table No. 3—1 Link at 8/6		8	6
Example " B "—12″ x 18″ Hinged Surround and Panel at 39/8	1	19	8
Table No. 4—12 Light Points at 58/4	35	0	0
Table No. 5—6 Power Points at 62/6	18	15	0
Table No. 6—Stove Connection only at 25/-	1	5	0
Table No. 6—Wash Boiler Connection at 30/-	1	10	0
Table No. 7—Say 25 ft. run to Stove at 2/9 ft.	3	8	9
Table No. 7—Say 30 ft. run to Wash Boiler at 2/9 ft. ...	4	2	6
Table No. 6—Off Peak Heater Installation at 35/- each ...	1	15	0
Table No. 7—30 ft. run to off Peak Heater at 2/4 ft. ...	3	10	0
Net Cost	£83	6	1

Builder to add service and profits.

PROTECTION AGAINST EARTH LEAKAGE.

Direct Earthing.

It is a dangerous fallacy to believe that the simple " earthing " of an installation by connecting conduits, etc., to the " earth " will make it impossible to receive an electric shock. This may afford protection in simple light installations, but increased loading, due to heavy current consuming appliances such as cooking ranges, hot water heaters, etc., leads to an increase in fuse ratings and necessitates lower earth resistance values.

It is only when this earth resistance or impedance to earth is sufficiently low that a current sufficiently large to melt the fuse will flow.

The resistance must be sufficiently low, under all possible conditions, such as the overfusing of cut outs and the deterioration of joints and bonds due to age, to open the circuit.

The only system that affords perfect protection against electric shock is the voltage operated earth leakage circuit breaker system.

THE EARTH LEAKAGE CIRCUIT BREAKER SYSTEM.

This system consists of a circuit breaker fitted with a trip coil, one end of which is connected to an electrode installed in a certain manner, the other end being connected to all exposed metal, the earthing pins of all outlets, and, if available, the water and gas services. The trip coil is so designed that, should the potential of any of the metals connected to it exceed a certain pre-determined safe value, the breaker will open the circuit and so disconnect the supply.

The conductor from the circuit breaker to the electrode must be 7/·029 Insulated Cable. The earthing conductors from circuit breaker to water and gas pipes may be bare.

ELECTRODES.

The earth electrode system used in conjunction with the E.L.C. Breaker consists of a pipe or pipes driven vertically into the ground to such a depth to ensure contact with the moist sub-soil with a minimum allowable depth of 4 feet.

The earth resistance of electrode must not exceed 200 Ohms. in series with the trip coil, which ensures that the breaker shall operate when a voltage of 20 to 26 volts is applied to the circuit. An alternating voltage of 30 volts is considered potentially dangerous.

When two or more electrodes are to be driven for connection in parallel, it is essential to so space them that the voltage gradients do not overlap, otherwise the minimum total resistance will not be obtained. If insufficient space is available to do this, they should be installed as far apart as possible. Generally, the spacing will be adequate if it is in excess of the length of the longest electrode.

Similarly, when a supplementary connection to the water service is used, the electrode should be at least six feet away from any water pipes, so that sufficient voltage will be impressed across the trip coil to operate the breaker should a fault develop.

When installing electrodes in holes drilled in rocks the packing between the rock and electrode should consist of low resistivity soil such as loam, clay, etc., which should be well tamped as the filling progresses, and not after the hole has been completely filled. The electrode should be installed as centrally as possible in the hole, although this is not so important as the method of filling.

Sand or rock chipping should not be used for packing around the electrode in any circumstances.

The following table shows the general relation between soil resistivity and electrode resistance for a $\frac{3}{4}''$ diameter galvanized water pipe driven 4 ft. vertically in the ground. The resistance was measured with an ohmmeter to the nearest water service, the electrode in each case being driven at least 15 ft. from any water or gas pipes, and the soil resistivity measured in ohms per centimetre cube, the soil in each case being taken from the bottom of the electrode when it was withdrawn.

SOIL RESISTIVITY AND ELECTRODE RESISTANCES.

Locality	Rough Type of Soil	Soil Resistivity	Electrode Resistance
		Ohms cms.	Ohms.
Lindfield ...	Black soil over red clay ...	3200	32
Earlwood ...	Soil over sandstone rubble	3700	370
Coogee ...	Black sandy loam ...	2100	207
Auburn ...	Clay	4300	43
Northbridge...	Decomposed sandstone ...	3700	25
Maroubra ...	Brown sand	63000	875

EARTH LEAKAGE CIRCUIT BREAKERS.

Method of Costing.

The costing of E.L.C.B's. consists of supply and mounting the circuit breaker together with electrode work and wiring to electrode. The cost of electrode work varies according to the resistivity of the earth or rock into which the electrode is driven, which determines the length of the piping or the number of pipes necessary to lower the resistance to 200 ohms. However, a minimum cost of electrode work in soil is shown as a guide. In sandstone the cost of drilling and the depth of hole will increase the cost.

APPROXIMATE COST—ELECTRODE—10 FEET IN SOIL.

	£	s.	d.
10 feet ¾" Gal. Water Pipe at 1/– foot		10	0
Earth Clips and Sundries		3	6
10 Yds. 7/·029 V.I.R. Conductor 35/2		3	7
Add 26 per cent. surcharge		1	0
Materials		18	1
Add Trade Allowance		3	8
Materials cost	1	1	9
Labour to Electrode	1	10	0
Erect and connect board	1	10	0
Minimum Cost of Electrode	£4	1	9

EARTH LEAKAGE SYSTEM.

When earth leakage system is required by authorities it may consist of one or more Earth Leakage Circuit breakers connected to earth electrode with 7/·029 Insulated Conductor

The earth electrode system consists of a pipe or pipes, rod or rods, approved by Authorised Inspector.

They are driven vertically into the ground to such a depth to ensure contact with moist sub-soil. When galv. water pipe is used it must be not less than ¾" internal diameter.

Allow a minimum cost of £4½ for materials and labour to earth electrode.

EARTH LEAKAGE CIRCUIT BREAKERS.

Type	Cost Plus 8⅓ per cent. Tax	20 per cent. Allowance	Labour & Mat. to Electrode	Minimum Cost
	s. d.	s. d.	s. d.	£ s. d.
25 Amp. S.P. Westinghouse E/L.	83 0	99 8	90 0	9 9 8
25 .. Double Pole ,, ,, ...	107 0	128 6	90 0	10 18 6
25 ,, Triple Pole ,, ,, ...	122 0	146 6	90 0	11 16 6
35 ,, Single Pole ,, ,, ...	101 0	131 3	90 0	11 1 3
35 ,, Double Pole ,, ,, ...	130 0	156 0	90 0	12 6 6
35 ,, Triple Pole ,, ,, ...	147 0	176 6	90 0	13 6 6
50 ,, Single Pole ,, ,, ...	109 0	131 0	90 0	11 1 0
50 ,, Double Pole ,, ,, ...	136 0	163 3	90 0	12 13 3
50 ,, Triple Pole ,, ,, ...	152 0	182 6	90 0	13 12 6
Self-Contained "B. & H." Circuit Breaker ...	64 0	77 0	90 0	8 7 0
2 Circuit "B. & H." ,, ,, ...	66 0	79 3	90 0	8 9 3
3 Circuit "B. & H." ,, ,, ...	69 0	83 0	90 0	8 13 0
4 Circuit "B. & H." ,, ,, ...	70 6	84 6	90 0	8 14 6

ELECTRIC SUPPLY STATIONS.
THROUGHOUT AUSTRALIA AND NEW ZEALAND.

NEW SOUTH WALES.

Sydney.—The main distribution to Sydney is a low voltage service carried out at 415/240 volts, 50 cycles, three phase alternating current, frequency controlled. About one square mile east of the boundaries of the Domain, College St., Wentworth Avenue and Elizabeth St. to the Central Railway is supplied at 480/240 volts, three wire direct current. This area is gradually being converted to alternating current. The whole of the towns and districts of New South Wales, with the exceptions listed below, are carried out at 415/240 volts, 50 cycles, three phase alternating current, frequency controlled.

The following stations distribute at 240 volts, direct current :— Ardlethan, Ariah Park, Barraba, Bingara, Collarenebri, Crookwell, Delegate, Gilgandra, Holbrook, Walla Walla and Weston.

Barham distributes at 400/230 volts, 5 cycles, 3 phase, alternating current.

VICTORIA.

Melbourne.—Distribution.—In the central portion of the city only, 460/230 volt, three wire Direct Current; in the remainder of the area, 400/230 volt, 50 cycles, three phase alternating current, frequency controlled. Note : For all installations in the D.C. area, confirmation of the system of supply must be obtained from the council.

The method of distribution to towns and districts are indicated by letters shown below. Most of the towns and districts are distributed by B. and only the exceptions are listed.

A = 200/400 Volts, 50 c/s., Single Phase Alternating Current, frequency controlled.

B = 460/230 V., 50 C/s., three phase A.C., frequency controlled.

C = 230 V. only, Single Phase A.C.

D = 230/400 V., 50 C/s., A.C., frequency controlled.

E = 460/230 V., three wire Direct Current.

F = 230 V., Direct Current.

G = 240 V., Direct Current.

H = 480/240 V., three wire Direct Current.

I = 415/240 V., 50 C/s., three phase A.C.

Towns and Districts Distributed by A.—Doncaster.

Towns and Districts Distributed by C.—Airey's Inlet, Allansford, Alvie, Anglesea, Balintore, Bostock's Creek, Bullaharre, Bullock Swamp, Caramut, Carranballic, Cobrico, Coragulac, Crossley, Cudgee, Darlington, Dixie, Eastern View, Elliminyt, Garvoc, Hawkesdale, Hexham, Irrewarra, Kariah, Killarney, Kirkstall, Kolora, Korongah, Lake Gillear, Larpent, Moyne View, Mumblin, Nalangil, Panmure, Pirron Yallock, Ponborneit South, Rickett's Marsh, Rosebrook, South Ecklin, Southern Cross, Stavely, Stoneyford, Streatham, Swan Marsh, Tesbury, Tower Hill, Wangoom, Warrong, Weerangourt, Westmere, Willatook, Woorndoo, Yangery.

VICTORIA—(continued).

Towns and Districts Distributed by D.—Alexandria, Ararat, Ascot, Avoca, Ballarat, Barwo, Beaufort, Beechworth, Benalla, Bendigo, Bonegilla, Bowser, Box Hill, Briar Hill, Bright, Broadmeadows, Brunswick, Buffalo River, Bungaree, Camperdown, Chiltern, Clayton South, Clunes, Cobden, Cobram, Coburg, Cohuna, Coleraine, Congupna, Cororooke, Corryong, Cowes, Craigieburn, Darnum, Daylesford, Deer Park, Devenish, Drouin, Dunolly, Echuca, Eldorado, Euroa, Eurobin, Footscray, Gapsted, Geelong, Girgarre, Glen Forbes, Glenormiston, Goorambat, Grahamvale, Greensborough, Greenvale, Hamilton, Harrietville, Heatherton, Heidelburg, Hepburn Springs, Heywood, Horsham, Inglewood, Kinava, Kerang, Kiewa, Koondrook, Koriot, Kyabram, Kyneton, Laanecoorie, Learmonth, Leongatha, Linton, Longford, Lucknow, Lyndhurst, Maffra, Majorca, Mansfield, Maryborough, Merrigum, Milawa, Mildura, Miner's Rest, Moe, Mooroopna, Mortlake, Murchison, Murrayville, Myrtleford, Nathalia, Natimuk, Newstead, Northcote, Numurkah, Omeo, Ovens, Picola, Port Fairy, Portland, Port Melbourne, Portsea, Preston, Pyramid Hill, Queenscliff, Raywood, Rutherglen, Sale, Seymour, Shepparton, Somerton, Springhurst, St. Arnaud, St. James, Swan Hill, Tallangatta, Tallygaroopna, Tally Ho, Tangamvalanga, Tarmeit, Tatura, Tawanga, Tecoma, Thomastown, Tongala, Trafalga, Trentham, Tullamarine, Tungamah, Violet Town, Waaia, Wahgunyah Wallace, Wangaratta, Wantirna, Warburton, Warracknabeal, Watsonia, Wedderburn, Williamstown, Winchelsia, Wodonga, Wool Wool, Wunghnu, Wycheproof, Yackandandah, Yarram, Yarrawonga, Yea, Yuroke.

Towns and Districts distributed by E.—Beulah, Dimboola, Nagambie, Nhill, Ouyen.

Towns and Districts Distributed by F.—Apollo Bay, Birchip, Boort, Broadford, Casterton, Charlton, Edenhope, Goroke, Gunbower, Hopetown, Jeparit, Kilmore, Minyip, Mitiamo, Murtoa, Orbost, Quambatock, Rainbow, Rupanyup, Rushworth, Servicetown, Underbool, Woomelang.

Distribution G.—Donald, Manangatang.

Distribution H.—Heathcote. **Distribution I.**—Wonthaggi.

QUEENSLAND.

Brisbane.—Brisbane City Council department of Electricity distributes to the following centres :—

DISTRIBUTION :—415/200 Volts, 50 C/s., 3 Phase Alternating Current, Frequency Controlled.—Balmoral, Coorparoo, Ennoggera, Hamilton, Ithaca, Kedron, Sandgate, Stephens, Sherwood, Tarenga, Toombul, Windsor, Wynnum.

Localities Supplied.

Gympie District, Northern District, Southern District, South Coast District, Tweed Shire, Ipswich District, Western District.

Toowoomba.—DISTRIBUTION—415/240 V., 50 C/s. 3 Phase A.C. frequency controlled, and 480/240 V. 3 wire, Direct Current. Toowoomba distributes to the following centres :—Allora, Broxburn, Cambooya, Charlton, Clifton, Drayton, Emu Vale, Finnie, Glencairn, Greenhills, Greenmount, Killarney, Kingsthorpe, Lanewood, Middle Ridge, Nobby, Oakey, Pittsworth, Shepperd, Southbrook, Swan Creek, Tannymorel, The Hollows, Umbiram, Watts Siding, Westbrook, Wyreema, Yangan.

QUEENSLAND—(continued).

Countiess and Towns Supply.

A = 240 Volts, Direct Current.
B = 480/240 Volts, 3 Wire, Direct Current.
C = 415/240 V., 50 C/s., 3 Phase Alternating Current.
D = 440/222 V., 3 Wire, Direct Current.
E = 220 Volts, Direct Current.
F = 240 Volts, 50 C/s. A.C.

Ayr C	Gladstone B & C	Murgon C
Barcaldine A	Goondiwindi C	Nanango C
Blackall B	Home Hill C	Pialba C
Bowen C	Hughendon B	Proserpine C
Bundaberg B & C	Ingham C	Rockhampton C
Cairns C	Inglewood C	Roma, C & E
Charleville B & C	Jandowae C	Sarina C
Charters Towers C	Kingaroy C	St. George B
Childers C	Longreach B & C	Stanthorpe C
Chinchilla C	Mackay C	Thargomindah E
Clermont C	Maryborough C	Theodore A
Cloncurry C	Miles C	Thursday Island C
Crow's Nest C	Mitchell C	Townsville C
Cunnamulla A	Monto C	Winton B
Dalley C	Mossman C	Wondai C
Emerald C	Mount Isa C	Yeppoon C
Gayndah C	Mount Morgan C	

The following towns supplied by licence :—

Biggenden A	Mount Mulligan A	Quilpie 110 V., D.C.
Cardwell E	Mundubbera A	Ravenshoe A
Giru C	Mungindi C	Springsure A
Imbil A	Ogmore C	Wallumbilla A
Jimna B	Pioneer Estates F	Yarraman C
Mount Garnet A	Proston A	

ELECTRIC SUPPLY STATIONS.

TASMANIA.

The Hydro-Electric Commission of Tasmania distributes to the following districts, and consumers' supply is 415/240 V., 50 C/s., three phase A.C., frequency controlled, except for the municipality of Sorell, where the supply is 240 V., 50 C/s., Single Phase A.C.

Districts Served by Hydro-Electric Commission.

Beaconsfield, Bothwell, Brighton, Burnie, Campbell Town, Cygnet, Circular Head, Deloraine, Derwent Valley, Devonport, Esperance, Evandale, Fingal, George Town, Glamorgan, Hamilton, Hobart, Huon, Kentish, Kingborough, Latrobe, Leven, Lilydale, Longford, Launceston, Oatlands, Penguin, Portland, Queenstown, Richmond, Ringarooma, Roseberry-Williamsford, Ross, Scottsdale, Sorell, Spring Bay, Strahan, Table Cape, Westbury, Zeehan.

TASMANIA—(continued).

Distribution in Other Towns.

Gormanston.—230 V. 50 C/s., Single Phase A.C.

Hobart.—415/240 V., 50 C/s., 3 Phase A.C.

Also 480 V., D.C., in centre of City for motive power only.

Launceston.—415/240 V., 50 C/s., 3 Phase A.C., frequency controlled.

Queenstown.—415/240 V., 50 C/s., 3 Phase A.C.

ELECTRIC SUPPLY STATIONS.

NEW ZEALAND—NORTH ISLAND.

Auckland.—The supply is in the hands of the Auckland Electric Power Board.

The district served includes the City of Auckland, together with the Boroughs of Onehunga, Otahuhu, Manurewa, Mount Albert, Mount Eden, One Tree Hill, Newmarket and Papakura; the Road districts of Mount Roskill, Panmure, Mount Wellington; the Town districts of Ellerslie, Papatoetoe, Howick, and the County of Manukau.

Distribution.—400/230 V, 50 C/s., three phase A.C. frequency controlled, and 460/230 V, three wire D.C. The D.C. area is in course of changeover to A.C. and enquiry to the Board is necessary before any power installation is made.

Wellington.—The supply is in the hands of the City Corporation.

Centres supplied include: Island Bay, Kaiwarra, Karori, Khandallah, Lower Kilburnie, Lyall Bay, Miramar, Ngaio, Seatoun, and Makara.

Distribution.—400/230 V., 50 C/s., three phase A.C., frequency controlled.

With few exceptions the distribution to the whole of North Island is 400/230 Volts, 50 C/s., three phase, Alternating Current, frequency controlled.

The exceptions are listed below.

List of Exceptions.

Bay of Islands.—460/230 Volts, 50 C/s., Single Phase A.C. frequency controlled.

Rawene.—230 Volts D.C.

Taihape.—460/230 Volts, three wire D.C. and 400/230 V., 50 C/s. 3 Phase A.C.

Tolaga Bay.—230 Volts, D.C.

NEW ZEALAND—SOUTH ISLAND.

The South Island is serviced by electric power boards similar to North Island, and, with few exceptions the distribution is 400/230 Volts, 50 C/s., three phase A.C. frequency controlled.

List of Exceptions.

Invercargill.—600 V., D.C., and 400/230 V., 50 C/s., 3 Phase A.C., frequency controlled.

Picton.—460/230 V., three wire D.C.

Rangiora.—400/220 V., 50 C/s., three phase A.C., frequency controlled.

Reefton.—240 Volts, D.C.

ELECTRICITY SUPPLY STATIONS.
SOUTH AUSTRALIA.

The city of Adelaide and the Southern and South-Western Subs. supplied at 416/240 Volts, 50 C/s., three phase, A.C., frequency controlled. The remainder of the suburbs is supplied at 416/208 Volts, single phase, three wire A.C., 50 C/s., frequency controlled, in the course of changeover to 416/240 V., 50 C/s.

Most of the towns and districts are distributed by B and only the exceptions are listed.

A = 416/240 V., 50 C/s., 3 Phase A.C., Frequency Controlled.
B = 416/208 V., 50 C/s., Single Phase, 3 Wire A.C., Frequency Controlled.
C = 415/240 V., 50 C/s., 3 Phase A.C., Frequency controlled.
D = 400/230 V., 50 C/s., 3 Phase A.C.
E = 240 Volts, Direct Current.
F = 220 Volts—Direct Current.
G = 110 Volts—Direct Current.
H = 460/230 Volts, three wire, Direct Current.
I = 400/230 V., 50 C/s., 3 Phase A.C.
J = 230 Volts—Direct Current.
K = 440/220 V., 3 Wire D.C.
L = 210 V., D.C.

Towns and Districts Distributed by A.—Booleroo, Centre, Bowmans, Echunga, Flaxley, Heathfield, Houghton, Inglewood, Kersbrook, Koolunga, Laura, Macclesfield, Mannum, Meadows, Modbury, Murraytown, Myponga, Normanville, Palmer, Parafield, Prospect Hill, Rapid Bay, Red Hill, Rowland's Flat, Snowtown, Stockwell, Strathalbyn, Tanunda, Teatree Gully, Tungkillo, Waterloo, Wirrabara, Yankalilla.

Towns and Counties distributed by C.—Barmera, Berri, Boorborowie Burra, Clare, Cleve, Crystal Brook, Cummins, Kimba, Kingston, Mannahill, Melrose, Meningie, Mingary, Naracoorte, Oodnadatta, Penola, Pinnaroo, Port Lincoln, Port Pirie, Stansbury, Terowie, Victor Harbour, Waikerie, Wallaroo, Whyalla, Woodside, Yongala.

Distribution by E.—Bute, Ceduna, Lameroo, Moonta, Port Broughton, Port MacDonnel, Quorn, Robe, Tumby Bay, Warooka.

Distribution by F.—Ardrossan, Cockburn, Cowell, Kadina, Kalangadoo, Karoonda, Port Vincent.

Distribution by G.—Elliston, Springton.

Distribution by H.—Davenport, Mount Gambier, Orroroo, Peterborough, Port Augusta, Renmark (Council), Tailem Bend.

Distribution by I.—Keith.

Distribution by J.—Kingscote, Loxton, Millicent, Minlaton, Port Victoria, Streaky Bay, Yorketown.

Distribution by K.—Murray Bridge.

Distribution by L.—Port Wakefield.

ELECTRIC SUPPLY STATIONS.
WESTERN AUSTRALIA.

Perth and suburbs are supplied from the East Perth power station and distribution is 440/250 V., 40 C/s., 3 Phase A.C., frequency controlled.

WESTERN AUSTRALIA—(continued).

Distribution to Towns.

A = 440/250 V., 40 C/s., 3 Phase A.C., Frequency Controlled.
B = 400/230 V., 50 C/s., 3 Phase A.C.
C = 415/240 V., 50 C/s., 3 Phase A.C.
D = 440/220 V., 3 Wire, Direct Current.
E = 460/230 V., 3 Wire, Direct Current.
F = 510/255 V., 3 Wire, Direct Current.
G = 220 Volts—Direct Current.
H = 230 Volts—Direct Current.
I = 250 Volts—Direct Current.
J = 550 Volts, 40 C/s., 3 Phase A.C.
K = 220 Volts, C/s. Single Phase A.C.
L = 240 Volts—Direct Current.
M = 480/240 V., three wire direct current.

TOWNS—WESTERN AUSTRALIA.

Albany A
Balingup G
Bassendean A
Bencubbin G
Beverley G
Big Bell G
Boddington G
Boulder D
Booyup Brook G
Bridgetown D
Brookton G
Broome D
Broomehill G
Bruce Rock E
Brunswick G
Bunbury D
Busselton I
Busselton West I
Capel G
Carnamah D
Carnarvon G
Claremont A
Collie (Town) F
Collie (Districts) A
Coolgardie A
Corrigin G
Cowaramup A
Cranbrook H
Cue G
Cunderdin G
Dalwallinu G
Denmark H
Derby G
Donnybrook G
Dowerin G
Dumbleyung G
Esperance H
Fremantle A
Geraldton D
Geraldton (Bluff Pt.) B
Gingin C
Gnowangerup H
Goomaling G
Greenbushes G
Guildford A
Harvey G
Kalgoorlie D
Kal. to Celebration Mine J & K
Katanning G
Kellerberrin D
Kojonup H
Kondinin D
Koorda A
Kulin G
Kununoppin G
Lake Grace G
Leonora D
Mandurah G
Manjimup I
Margaret River A
Marvel Loch G
Meckering G
Meekatharra G
Menzies H
Merridin G
Midland Junction A
Mingenew G
Moora G
Morowa G
Mount Barker G
Mount Magnet G
Mullewa L
Mundaring G
Nannup G
Narembeen G
Narrogin A
Norseman A
North Fremantle A
Northam D
Northampton G
Mungarin G
Pemberton D
Perenjori G
Pingelly G
Pinjarra G
Port Hedland G
Quairading G
Ravensthorpe G
Reedy C
Rottnest G
Shakleton G
South Perth A
Southern Cross G
Subiaco A
Tambellup G
Tammin G
Three Springs G
Toodyay G
Trayning G
Wagin H
Waroona G
Westonia G
Wickepin G
Williams L
Wiluna A
Wongan Hills H
Wyalkatchem G
Yalgoo G
Yallingup G
Yarloop M
York I

PACIFIC ISLANDS.

Apia (Samoa).—220/110 V., 50 C/s., Single Phase, A.C.

Lautoka (Fiji).—415/240 V., 50 C/s., Three Phase, A.C.

Nauru.—550 V., 50 C/s., 3 Phase, A.C.—Lighting 110 V., 50 C/s., Single Phase A.C.

Ocean Island.—550 V., 50 C/s., 3 Phase, A.C.—Lighting 110 V.—50 C/s., Single Phase, A.C.

Port Moresby, Papua—415/240 V., 50 C/s., three phase A.C.

Samarai— ,, ,, ,, ,, ,, ,, ,,

Rabaul— ,, ,, ,, ,, ,, ,, ,,

Lae— ,, ,, ,, ,, ,, ,, ,,

Madang— ,, ,, ,, ,, ,, ,, ,,

Suva (Fiji).—415/240 V., 50 C/s., 3 Phase, A.C. : also 480/240 V., three wire D.C.

Wau (New Guinea).—440/250 V., 50 C/s., three phase A.C.

COMMONWEALTH TERRITORY.

Canberra.—415/240 V., 50 C/s., three Phase A.C. frequency controlled.

Darwin.—415/240 V., 50 C/s., three Phase A.C.

Katherine, Tennants Creek, Alice Springs.—415/240 V., 50 C/s., three phase A.C.

ENGINE OPERATED LIGHTING UNITS.

3 H.P. Air Cooled Plant, 32 Volts, 1,250 Watts.

The lighting plants are complete units of engine and generator complete. Manufactured in air and water cooled types, and running on either petrol or power kerosene.

They have a simplicity of design, enabling an ordinary mechanic to make any necessary adjustment. Ten second push button starting either hot or cold.

The motor need only be operated once or twice a week, if used for lighting alone. The battery acts as a reservoir for current generated while using the belt or electric power for other purposes. The governor controls the speed of the engine, and the voltage—there's no over-charging of batteries or burning out of lamps.

12, 32, 50, or 110 voltage, 500 to 2,500 watts, Quirk's Plants run on either petrol or power kerosene. Fuel consumption of the average user is only one gallon per week. The Plants produce an abundance of power—sufficient for brilliant lights, household appliances, and small motors—with plenty of reserve power to assure many years of dependable service. Engine speed is from 1,000 to 1,500 R.P.M. according to load.

APPROXIMATE PRICES.

"QUIRK'S" ENGINE OPERATED 32 VOLT LIGHTING SETS.

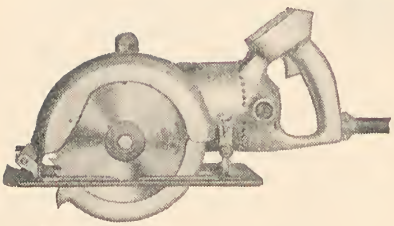
	H.P.	Volt	Watts		£	s.	d.
Air Cooled	1	32	400	Direct Drive ...	97	10	0
Water Cooled Tank Type	2	,,	750	V Belt Drive ...	187	10	0
Water Cooled Radiator	2	,,	750	,, ,, ,, ...	207	10	0
Air Cooled	3	,,	1,250	,, ,, ,, ...	198	10	0
Water Cooled Tank Type	3	,,	1,250	,, ,, ,, ...	220	0	0
Water Cooled Radiator	4	,,	1,500	,, ,, ,, ...	270	0	0

Note.—Too small a plant may prove inefficient and costly.

For Advice and current prices See Advertisement, Page 23.

PORTABLE ELECTRIC TOOLS.

Portable Electric Saw.

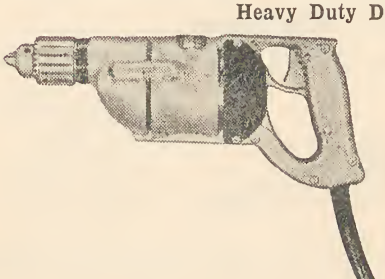


Available in two models
7″ & 9″
Nett Aust. Selling Price—
7″ Saw—£49 0s. 0d.
9″ Saw—£67 0s. 0d.

	7″ Saw	9″ Saw
Diameter of Saw Blade	7″	9″
Diameter of Spindle	1⅛″	1⅜″
Maximum Vertical Depth of Cut	2⅜″	3⅛″
Maximum Cut at 45°	1¾″	2⅜″
No-Load Speed (R.P.M.)	3,200	2,500
Weight	18¾ lbs.	26 lbs.
Overall Length	17½″	19¼″

Standard Equipment.—3-core cable (third wire for earthing); 2-pole instant release switch; adjustable saw table; detachable ripping fence; one combination rip and cross-cut blade; carrying case; ½-lb. can special lubricant for worm gear; T-handle wrench.

Heavy Duty Drills.



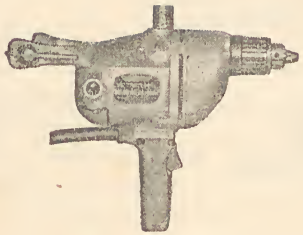
Nett Aust. Selling Price:
¼ Heavy Duty—
£19 18s. 0d.
5/16 Heavy Duty—
£20 15s. 0d.

Sturdy, perfectly balanced drills for constant service on production and heavy-duty maintenance work, the ¼″ and 5/16″ Heavy Duty Drills are constructed with thrust absorbing ball-bearings for motor and needle roller bearings in back end of chuck spindle.

The automatic release switch is equipped with locking pin for optional use.

	5/16″ H. Duty	¼″ H. Duty
Drilling Capacity in Steel	5/16″	¼″
Drilling Capacity in Hardwood	⅝″	½″
No Load Speed (R.P.M.)	1,400	2,000
Net Weight	7 lbs.	6¾ lbs.
Overall Length	12⅜″	12¼″

Utility Drills.



Nett. Aust Selling Price :—

⅜ Heavy Duty Drill —£24 1s. 0d.

½ Standard Drill —£24 8s. 0d.

The ⅜″ Heavy Duty and ½″ Utility Drill are popular general purpose portable electric drills. You will note their perfect operating balance instantly. The close-coupled construction, minimum spindle offset and horizontal spade handle are important features—particularly when drilling in a close space.

	⅜″ H. Duty	½″ Utility
Drilling Capacity in Steel	⅜″	½″
Drilling Capacity in Hardwood	¾″	1″
No Load Speed (R.P.M.)	900	400
Net Weight	10½ lbs.	10¾ lbs.
Overall Length	13½″	13¾″

Portable Electric Sanders.

Available in two models, 7″ Standard and 7″ Heavy Duty.



Nett Aust. Selling Price:—

7″ Standard —£28 0s. 0d.

7″ Heavy Duty —£32 8s. 0d.

Versatile surfacing tools, used with a wide variety of attachments for sanding, grinding, wire brushing, rubbing and shaping operations on metal, wood, stone, tile, concrete and many other surfaces.

These Sanders are fully powered with B. & D. " universal " motors ; perfectly balanced, with reversible side handles for right or left hand use ; spiral bevel gears of heat-treated alloy are matched and lapped ; bearings are grease-sealed.

	7″ Standard	7″ H. Duty
Dia. of Flex. Pad	7″	7″
No-Load Speed (R.P.M.)	4,200	4,200
Weight in lbs.	12¾″ lbs.	14¼ lbs.
Overall Length (excluding Pad)	17½″	18″

For Quotes See Advertisement, Page 15.

GLASS BRICKS

"Insulux" Hollow Glass Brick Construction.

Where a maximum of diffused daylight is required to light the interiors of buildings the use of glass bricks is recommended. Besides being an attractive unit the glass brick ensures privacy. They are sound and heat insulating, non-combustible, moisture, acid and vermin proof and will not absorb odours or grease. The hard surface is not easily defaced, is easily cleaned and requires practically no maintenance.

Plastering, papering, rendering or painting is not required either externally or internally, thus making the bricks a sound economical proposition. The bricks are strong, light and of a size easily handled by the bricklayer.

Because of the foregoing advantages Glass Bricks are being used in almost every type of building being erected to-day—in HOMES, OFFICES, FACTORIES, HOSPITALS, FLATS, HOTELS, SHOPS, RESTAURANTS, APARTMENTS, CLUBS, THEATRES, SCHOOLS, GARAGES and SERVICE STATIONS, LABORATORIES, etc. In fact, their uses are almost UNLIMITED.

The following details in connection with the use of Glass Bricks in constructional work are supplied merely as a guide. For full information and essential details for erection communicate direct with the manufacturers of "Insulux" Glass Bricks, who will be pleased to render service and quotes.

See advertisement, page 18.

"Insulux" Glass Bricks, while of great structural strength, are definitely NOT sold as A LOAD BEARING MATERIAL. Under no circumstances should they carry any super-imposed loading—therefore it is necessary that lintels be used over all openings irrespective of the width.

It is important that EXPANSION JOINTS BE PROVIDED at the HEAD and JAMBS of all "Insulux" panels, irrespective of the height and width. A minimum expansion joint of ¾in. must be provided at the head and ½in. at jambs of all panels.

Glass Bricks should be recessed into chases in adjacent building material at least 1½in. at both the head and jambs of all panels over 5ft. 0in. wide, this recess to be additional to the expansion joints mentioned above, and ALL EXPANSION JOINTS MUST BE KEPT CLEAR OF MORTAR OR OTHER EXTRANEOUS MATTER.

Inaccessible expansion joints should be filled with loosely packed Picker Tow or similar, obtainable from any rope manufacturing firm or direct from the manufacturer of "Insulux", or their local representatives.

Where the Glass Bricks are recessed into adjacent building materials it is necessary that the aperture on either side of the Glass Brick and between the Glass Bricks and the adjacent building materials, be packed firmly with Picker Tow or similar, to ensure lateral strength, and this aperture must also be caulked at the outer edges for at least ¼in. (to ensure a weather-proof job) with a guaranteed non-hardening water-repellant caulking compound.

Mortar Mix.

12 parts of clean sand (by volume)
4 „ „ cement (by volume)
1 „ „ hydrated lime (by volume)

Work with mortar as stiff as possible. WATER MUST NOT BE USED FREELY. If mortar is too wet it will retard the laying and possibly cause voids.

Laying.—Fill all mortar joints completely. DO NOT STRIKE GLASS BRICKS WITH METAL TOOLS.

Lay up not more than five courses of the 6½in. square Brick at a time, and allow the mortar to attain its initial set before continuing with succeeding courses. All mortar joints should be ¼in. in thickness and should be tooled after the mortar has attained its initial set, to ensure a finished job.

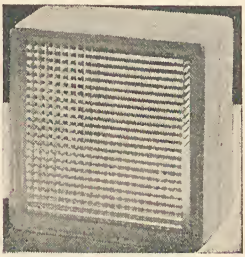
ALL EXTERIOR FLUTINGS ON GLASS BRICKS ARE TO BE SET VERTICAL.

Reinforcement.—2½in. brickwork reinforcement is recommended for reinforcing, and should run continuously the full width of the panel and be tied into the adjacent brickwork or reinforced concrete at least 12in. when openings to take Insulux are being built. If channel iron or angle irons are used to form a chase at either end of the panel, the reinforcing should be welded or bolted thereto. In the case of timber framed construction, the reinforcing must be nailed securely with galvanized clouts at the jambs. The reinforcing should be embedded in the centre of the mortar joints.

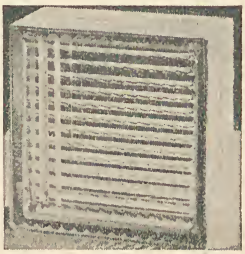
Reinforcement must be kinked in expansion joints at jambs.

In panels not exceeding 60 square feet in area and not exceeding 10 feet in length or height, the reinforcing should be used every third course in the case of the 6½in. square Glass Bricks. For reinforcing panels of a greater dimension please refer to the manufacturer.

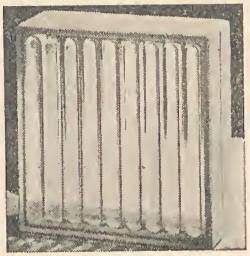
IF IN DOUBT ON ANY POINT COMMUNICATE IMMEDIATELY WITH THE MANUFACTURERS OR THEIR REPRESENTATIVES.



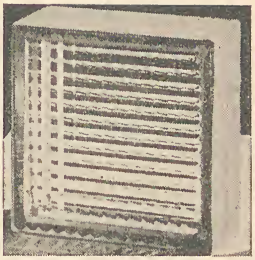
Series No. A4 consists of ¼ inch ribs, carried vertically on both exterior faces and horizontally on both interior faces. Size: 6½ inches square by 4 inches thick.



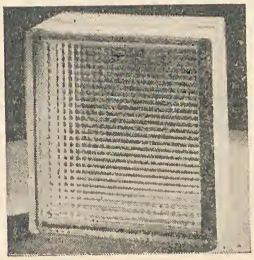
Series No. F4 consists of ¼ inch ribs carried vertically on both exterior faces and horizontally on both interior faces. Size: 6½ inches square by 4 inches thick.



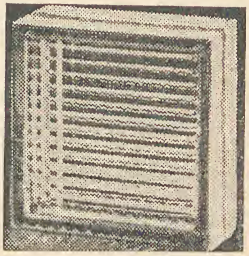
Series No. H4 consists of ½ inch ribs carried vertically on both interior faces. Both exterior faces are smooth. Size: 6½ inches square by 4 inches thick.



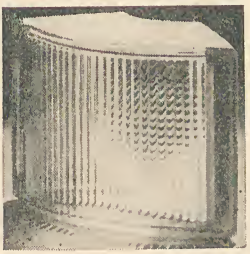
Series No. K4 consists of ½ inch ribs carried vertically on one interior face and horizontally on the other. Exterior faces are smooth. Size: 6½ inches square by 4 inches thick.



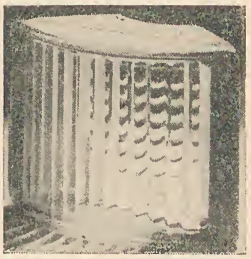
Radial Brick, Series No. A4. Can be laid to varying radii from 2ft. 6in. to 6ft. through variation in mortar joint. Width of wide face 6½ inches; of narrow face 5⅞ inches. This brick also available in the same size in F4 series. Radial bricks are available only for use in conjunction with the 6½ inch square by 4 inch thick bricks.



Radial Brick Series No. F4 can be laid to varying radii from 2ft. 6in. to 6ft. through variation in mortar joint. Width of long face 6½ inches; of short face 5⅞ inches. Available in the same size in A4 series.



Light Transmitting Corner Brick, Series No. A4. Height 6½ inches. Light Transmitting Corner Bricks are available only for use in conjunction with the 6½ inch square by 4 inch thick bricks.



Light Transmitting Corner Brick, Series No. F4 Height 6½ inches. Light Transmitting Corner Bricks are available only for use in conjunction with the 6½ inch square by 4 inch thick bricks.

Number and Weight of Glass Bricks in Walls and Panels.
Per Square Yard—Laid ¼in. Joints.

	Approximate Weight Laid
6½″ x 6½″ Glass Bricks — 28½ Bricks per sq. yd.	152 lbs.

Cost of Glass Bricks.

In estimating the costs of glass bricks, it is necessary to obtain latest quotes from the manufacturers. This is due to the fact that, when freight or transport is necessary beyond Sydney, the bricks must be packed in cartons to prevent damage, and this combined with the freight or transport will increase the cost of bricks. For this reason, the approximate costs shown are for Sydney only, where crates are returnable.

The examples will serve as base or approximate costs, to which the tenderer must add packing and transport charges.

Reinforcement, caulking compound and Picker Tow are not included and must be estimated as separate items.

Approximate Costs—Straight Walls.
Example No. 1—Per Square Yard Laid.

	£	s.	d.
6½″ x 6½″ Glass Bricks—28½ estimated at	3	12	0
Mortar		1	6
Labour Laying		10	6
Approximate nett cost—per square yard	£4	4	0

Allow reinforcement 3½d. per yard run and caulking compound approx. 2/– square yard.

Add allowance for caulking compound and Picker Tow (or similar) for chase construction or caulking compound only where chases are not used. (See information below).

Add packing charges, freight and profit.

Example No. 2—Curved Work—Per Square Yard Laid—Face

	£	s.	d.
6½″ x 6″ Radial Bricks—28½ Bricks estimated at ...	3	19	0
Mortar		1	6
Labour Laying		13	0
Approximate cost per square yard—Face measurement	£4	13	6

Add reinforcement, packing, transport and profit.

For small panels and areas allow extra.

Caulking compound.—1lb. will caulk 5 lineal feet of 1in. x ¼in. joint.

Picker Tow.—Allow for 1lb. for 4 lineal feet to loosely pack back of chase and tightly pack both sides of chase.

See "Insulux" Glass Brick advertisement, pink page 18.

GLAZIER

Glass is measured by the superficial foot, and the glazing is usually done by the firm supplying the glass.

PRICES OF AUSTRALIAN GLASS—PER SQUARE FOOT.

	s.	d.
16 oz. Clear Sheet Glass.		
0 to 70 united inches Cut to size	1	0½
71 to 80 „ „ „ „ „	1	2
21 oz. Clear Sheet Glass.		
0 to 70 united inches Cut to size	1	3½
71 to 80 „ „ „ „ „	1	4
81 to 100 „ „ „ „ „	1	8½
26 oz. Clear Sheet Glass.		
0 to 70 united inches Cut to size	1	6½
71 to 80 „ „ „ „ „	1	9½
81 to 100 „ „ „ „ „	2	0½
32 oz. Clear Sheet Glass.		
0 to 70 united inches Cut to size	2	3
71 to 80 „ „ „ „ „	2	4½
81 to 100 „ „ „ „ „	2	5
¼″ Wired Cast.—Cut to size	2	6½
¼″ Wired Cast Louvres (Subject to suitable cutting from offcuts).		
Up to 4″ wide	2	2
Over 4″ up to 6″ wide	2	3
Mill Rolled and Cast.—⅛″ thick	1	7½
3/16 thick	1	10½
¼″ thick	2	2½
¼″ Mill Rolled Louvres (Subject to suitable cutting from offcuts).		
Up to 4″ wide	2	2
Over 4″ up to 6″ wide	2	3
⅛″ Figured Rolled.—White—Cut to size	1	7½
Tinted „ „ „	2	4
3/16″ Moderne Fluted.—Cut to size	2	5
Drawn Sheet—3/16″ Thick.		
Up to 5 square feet cut to size	3	6
5 to 10 „ „ „ „ „	3	6
10 to 15 „ „ „ „ „	3	6½
Over 15 „ „ „ „ „	3	9
¼″ Thick.		
Up to 5 square feet cut to size	3	11½
5 to 10 „ „ „ „ „	3	11½
10 to 15 „ „ „ „ „	4	0
Over 15 „ „ „ „ „	4	2½
Coldlite.—⅛″ thick cut to size	2	5
3/16″ „ „ „ „	2	10
¼″ „ „ „ „	3	3
Crystaline.—⅛″ thick cut to size	2	6½
3/16″ „ „ „ „	2	8½
¼″ „ „ „ „	2	11

AUSTRALIAN PLATE GLASS—PER SQUARE FOOT.

¼″ Clear Plate.	s.	d.
Sizes Up to 2 sq. ft.	4	11
,, From 2 square feet to 3 square feet ...	5	1½
,, ,, 3 ,, ,, ,, 5 ,, ,, ...	5	2
,, ,, 5 ,, ,, ,, 7 ,, ,, ...	5	4
,, ,, 7 ,, ,, ,, 10 ,, ,, ...	5	4½
,, ,, 10 ,, ,, ,, 15 ,, ,, ...	5	9
,, ,, 15 ,, ,, ,, 25 ,, ,, ...	5	9½
,, ,, 25 ,, ,, ,, 50 ,, ,, ...	6	1½
,, ,, 50 ,, ,, ,, 75 ,, ,, ...	6	8
,, ,, 75 ,, ,, ,, 100 ,, ,, ...	7	4½
,, ,, 100 ,, ,, ,, 120 ,, ,, ...	9	8½
,, ,, 120 ,, ,, ,, 140 ,, ,, ...	12	3
,, ,, 140 ,, ,, ,, 160 ,, ,, ...	15	10

¼″ Silvered Plate.		
Sizes Up to 2 sq. ft.	6	8
,, From 2 square feet. to 3 square feet ...	7	0
,, ,, 3 ,, ,, ,, 5 ,, ,, ...	7	3½
,, ,, 5 ,, ,, ,, 7 ,, ,, ...	7	5
,, ,, 7 ,, ,, ,, 10 ,, ,, ...	7	6
,, ,, 10 ,, ,, ,, 15 ,, ,, ...	7	11½
,, ,, 15 ,, ,, ,, 25 ,, ,, ...	8	1½
,, ,, 25 ,, ,, ,, 50 ,, ,, ...	8	9½
,, ,, 50 ,, ,, ,, 75 ,, ,,	9	7
,, ,, 75 ,, ,, ,, 100 ,, ,, ...	10	7

PATENT LOUVRES (See Carpenter).

GLAZING CHARGES—WOOD SASHES.

Labour and Materials—Per Square Foot.

Sheet Glass, Figured, Rolled, Cathedral, Coldlite, Wired Glass, etc.	Material s. d.	Labour s. d.
Inside Merchants' Factory	3	6
Outside Merchants' Factory	3	8
Plate Glass: Inside Factory	3	7
Outside Factory	3	9½
Small squares glazed at 15/10 per hour plus materials.		
Steel Glazing Bars—Asbestos Cement Fittings or Roof Glazing where no Putty is required ...	—	10½
Glazing in Steel, Asbestos Cement Fittings or Roof Glazing where Putty is supplied bedded and faced or bedded	11	8
Steel Framed Glazing, in Standard Fittings ...	11	8
Steel Framed Glazing from Scaffold or Bosun's Chair	11	10½
Plate Glass Shop Fronts—New Work.		
Up to 100 Square Feet	3	10½

Plate Glass Replacement—Includes Removing Old Glass.

	Material s. d.	Labour s. d.
Up to 100 square feet	3	1 11½

Glazing at High Levels extra.

PROCESSING RATES.

Silvering—All Types of Flat Glass—Per Square Foot.

	Material	Labour
Sizes up to 2 square feet	4	1 5½
„ from 2 to 3 square feet	4	1 6½
„ „ 3 to 10 „ „	4	1 9½
„ „ 10 to 15 „ „	4	1 10½
„ „ 15 to 25 „ „	4	2 0
„ „ 25 to 50 „ „	4	2 3½
„ „ 50 to 75 „ „	4	2 7
„ Over 75 „ „	4	2 10½

Silvering Bent Glass.—Labour at 15/10 per hour plus material.

Silvering Customer's Own Glass (at Owner's Risk).—Labour at 15/10 per hour plus material.

Silvering Customer's Plate Glass — At Owner's Risk.

	Per Sq. Ft. s. d.
Sizes up to 5 ft. super	2 7
„ from 5 to 15 feet super	3 2
„ „ 15 to 25 „ „	3 5½
„ „ 25 to 50 „ „	4 7½

Glass Silvered after writing, 6½d. per foot extra.

Prices to be charged on full area of Plate.

Stripping and Resilvering (At Owner's Risk).

	Per Sq. Ft. s. d.
Sizes Up to 7 feet super	3 2
„ from 7 to 10 feet super	3 5½
„ „ 10 to 15 „ „	3 9
„ „ 15 to 25 „ „	4 0

Hacking out and Reglazing and Removing Owner's Own Glass from Beaded Openings on a time basis at approved hourly rate plus travelling time, material and fares.

Plate Glass required to be cut to irregular shapes including ovals and circles, 3d. per foot extra on list price.

Irregular to be defined as any plates not strictly rectangular in shape.

Up to 2″ Radius Corners to be regarded as square.

Bevelling—

Width	Per Foot Run. ¾″	⅞″ & 1″	1¼″	1½″
Up to 10 ft. lineal	1/2	1/4	2/0	2/5
From 10 to 12 lineal	1/4	1/6½	2/3½	2/10½
„ 12 to 15 „	1/8½	2/0	2/7	3/3
„ 15 to 20 „	2/3½	2/10½	3/5½	3/9
„ 20 to 25 „	2/10½	3/9	4/10½	5/5½
„ 25 to 30 „	3/9	4/7½	5/9	6/7½

⅛″ Bevel and Ground Edges (combined)
Diminished Bevel
Chipped and Arrissed Edges.
} Same rates as ¾″ Bevel.

Blind Bevelling.—Double ordinary bevelling rates.

Bevelling Charges.—To be calculated on the rate for the total lineal measurements, whether all the edges are processed or not.

SHAPED BEVELS, ETC.—EXTRA.

	Up to 10ft. Super. Each	Over 10ft. Super. Each
Inward Mitres.		
On Rounded and Polished Edges ...	2/3½	3/2
,, Arrissed, Ground or Diminished Bevel...	1/3	1/9
,, Full ¾″ Bevel	2/10½	3/2
,, ,, ⅞″ ,, }	3/5½	3/9
,, ,, 1″ ,, }		
,, ,, 1¼″ ,, ...	4/7½	5/9
,, Diminished Bevel and Arrissed Edge ...	2/3½	3/5½
,, Full ¾″ Bevelled and Arrissed Edge ...	3/9	4/10½
Shape rates to be charged for each process.		
Scallops—		
On Rounded and Polished Edges	1/2	2/–
,, Ground and/or Arrissed Edges ...	–/10½	1/6
,, Diminished or Full ¾″ Bevel	2/–	2/7
,, ,, ,, ,, ⅞″ ,, } ...	2/10½	3/5½
,, ,, ,, ,, 1″ ,, }		
,, ,, ,, ,, 1¼″ ,, ...	3/9	4/7½
,, ¾″ Bevelled and Arrissed Edge ...	2/10½	3/9
Finger Slots in Glass—	Each	
Up to 3 ft. super	2/3½	
3 ft. to 5 ft.	2/10½	
5 ft. to 10 ft.	3/5½	
10 ft. to 15 ft.	4/7½	
Over 15 ft.	5/9	

Ovals or Circles.—Whether arrissed or ground to be charged at ground edged rates.

Polished Edges (Round or Flat) ¼″ to ⅜″.	Per Ft. Run.
Sizes up to 10 feet lineal	9d.
,, from 10 to 12 ,, ...	10d.
,, ,, 12 to 15 ,, ...	1/4
,, ,, 15 to 20 ,, ...	2/3½
,, over 20 feet lineal—special quotation.	

Polished Edges—½″ substance	Per Ft. Run.
Sizes up to 10 feet lineal	1/6½
,, from 10 to 12 ,, ...	2/–
,, ,, 12 to 15 ,, ...	3/3
,, ,, 15 to 20 ,, ...	5/9
,, over 20 feet lineal—special quotation.	

Bullnose Edges—In ¼″ to ⅜″.	Per Ft. Run
Sizes up to 10 feet lineal	1/6½
,, from 10 to 12 ,, ...	2/–
,, ,, 12 to 15 ,, ...	3/3
,, ,, 15 to 20 ,, ...	5/9
,, ,, 20 to 25 ,, ...	7/–
,, ,, 25 to 30 ,, ...	10/4

Polishing charges to be calculated on the rate for the total area, whether all the edges are processed or not.

Shapes.—Triangle and Diamond Shapes to be charged as Squares.

Grinding and Polishing Edges on all Wired Glass, 4d. per foot extra.

Polished Edges (Round or Flat), ¼″ to ⅜″

Serpentines and Hollows in Length or Width—

Per Plate containing one hollow.	Per Ft. Run
Sizes up to 12″	1/5½
,, ,, ,, 24″	2/–
,, ,, ,, 36″	2/7
,, ,, ,, 48″	3/5½
,, ,, ,, 60″	4/4

For Plates containing more than one hollow, 2/9 per additional hollow (minimum), in length or width.

Shapes not mentioned, same price as Bevels.

Grinding Flat or Round Edges—	Per Ft. Run
Sizes up to 10 feet lineal	5d.
,, from 10 to 12 ,, ...	6d.
,, ,, 12 to 15 ,, ...	7d.
,, ,, 15 to 20 ,, ...	11½d.
,, ,, 20 to 25 ,, ...	1/9
,, ,, 25 to 30 ,, ...	2/11
,, ,, 30 to 50 ,, ...	4/4

Grinding charges to be calculated on the rate for the total lineal measurement, whether all the edges are processed or not.

Shapes on ground edges half price of polished edges.

Polished Edges (Round or Flat) ¼″ to ⅜″ Substance.

Rough Arrissing.	Per Ft. Run
Sizes up to 10 feet lineal	3d.
,, from 10 to 15 ,, ...	5d.
,, over 15 feet ,, ...	7d.

Smooth or Polished Arrissing.	Per Ft. Run
Sizes up to 10 feet lineal	5d.
,, from 10 to 12 ,, ...	6d.
,, ,, 12 to 15 ,, ...	7d.
,, ,, 15 to 20 ,, ...	11½d.
,, ,, 20 to 25 ,, ...	1/8½
,, ,, 25 to 30 ,, ...	2/11

Shapes to be charged extra, as shown under heading Shaped Bevels, etc.

Ovals or Circles.—Whether arrissed or ground to be charged at ground edged rates.

Drilling Holes—All types of glass—Each.

Size of hole up to ...	¼″	⅜″	½″	⅝″	¾″	⅞″	1″
Up to and including ¼″ substance	1/6	1/9	2/–	2/4	2/8	3/1	3/6

For every additional ⅛″ in size of hole, 4d. extra.

For every additional ⅛″ in thickness of substance above ¼″, add 5d. per hole extra.

Pay Holes and Speaking Holes.

Bevelled, Polished (or both), in plates up to 8 feet super. Each hole, 23/–.

Over 8 feet super—Each hole, 26/–.

Mitre Grinding for Barless Angles Including Part Holes—

	Per lin. ft.
Plates not over 25 sq. ft. or 84″ long	2/3
Plates over 25 sq. ft. and not exceeding 96″ x 54″ ...	2/11
Plates in excess of the above sizes	3/9

WEIGHTS.

WEIGHT OF GLASS PER SQUARE FOOT.

Thickness, ins. ...	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1
Weight, lbs. ...	$1\frac{3}{4}$	$2\frac{1}{2}$	3	5	7	$8\frac{1}{2}$	10	13

LARGEST SIZES OF SHEET GLASS MANUFACTURED.

Weight per sq. foot.	Length.	Width.
16 ounce	60″	50″
21 ,,	60″	60″
26 ,,	72″	60″
32 ,,	84″	60″

Cutting Glass Gauge Tubes.

The proper way is to take the point of small file and simply scratch the inside of the tube all round at the part you want it cut, and if the piece does not fall off in your hand at once, lay it aside for a little and you will find it as you want it in a very short time.

Removing Old Glass from Sashes.

Run a hot soldering iron (or other hot metal) along surface of putty to soften same, then scrape with knift or chisel.

"PERSPEX" ACRYLIC SHEET.

"Perspex" is the registered trade name for acrylic resin sheets manufactured by Imperial Chemical Industries Ltd. Clear "Perspex" is now familiar to all as a glazing material. "Perspex" is also supplied in colours—both transparent and opaque. The material is made in a wide range of sizes and thicknesses.

"Perspex" has many applications where light weight, toughness, durability and extreme transparency are desired. Its ease of shaping, working and repairing are of special value.

For glazing applications it is used in either transparent or translucent forms, and as well as the familiar smooth sheet is available in reeded, or corrugated sheets to match standard roofing materials.

WORKING OF "PERSPEX"

Cutting.—"Perspex" can be cut on any high-speed band or circular saw as used for cutting wood. The best results are obtained with a fairly fine saw having about fourteen teeth to the inch and very little "set". Dry cutting gives a good edge, but the finish can be improved by freely lubricating with water. Any tendency to cracking can be lessened by slightly warming the material, but local overheating must be avoided.

Small pieces of "Perspex" can be cut with a fret- or hack-saw, but the process is slow as the material tends to overheat, causing the saw to stick. Thin sheets, e.g. $\frac{1}{32}$″ and less, can, with care, be scribed and broken along the scratch mark.

Drilling and Boring.—"Perspex" can be drilled with ordinary twist drills. The following drilling speeds are recommended:

$\frac{1}{16}$″ dia, 7,000 r.p.m.; $\frac{1}{4}$″, 1,800 r.p.m.; $\frac{1}{2}$″, 900 r.p.m.

Fixing.—When fitting "Perspex" into a frame plenty of room should be allowed for expansion due to temperature changes. Care should also be taken not to fix "Perspex" rigidly to metal. It is usual to employ a glazing compound which is based on rubber, such as "Bostik", for making a weathertight joint between "Perspex" and the metal frame.

Cementing and Jointing.—There are two cements for "Perspex", namely "Diakon" Cement No. 2 and "Perspex" Cement No. 6. As both are liable to become very viscous when exposed to the air, they should be kept in containers with well-fitting stoppers.

"Diakon" Cement No. 2 is a quick-hardening cement suitable for cementing "Perspex" to "Perspex" when the area of contact is relatively small. Joints made with this cement should be left undisturbed for about an hour, after which they will be sufficiently set to withstand handling.

"Perspex" Cement No. 6 is a slow-hardening cement and its use is recommended for cementing "Perspex" to "Perspex" when the area of contact is large. Joints made with this cement should not be disturbed for about three hours after cementing.

"Perspex" sheets are manufactured in sizes 48″ x 36″.
Sheets $\frac{3}{16}$″ and $\frac{1}{4}$″ thick also in 50″ x 40″ sheets.
Sheets $\frac{5}{16}$″ thick also in 48″ x 30″ sheets.
Sheets $\frac{3}{8}$″ thick also in 48″ x 16″ sheets.

APPROXIMATE PRICES—PER SQUARE FOOT.

PLASTICISED.

Thickness	6,000 sq. ft. and over	1,200–5999 sq. ft.	360–1,199 sq. ft.	Under 360 sq. ft.
	s. d.	s. d.	s. d.	s. d.
$\frac{1}{24}$″ ...	6 10	6 11	7 1	7 9
$\frac{1}{16}$″ ...	5 10	5 11	6 1	6 7
$\frac{3}{32}$″ ...	6 0	6 2	6 3	6 10
$\frac{1}{8}$″ ...	6 9	6 10	7 0	7 8
$\frac{5}{32}$″ ...	7 9	7 11	8 1	8 9
$\frac{3}{16}$″ ...	8 7	8 10	9 0	9 9
$\frac{7}{32}$″ ...	9 1	9 4	9 6	10 5
$\frac{1}{4}$″ ...	10 8	10 11	11 6	12 1
$\frac{1}{4}$″ ...	10 1	10 4	10 7	11 6
$\frac{9}{32}$″ ...	10 3	10 6	10 9	11 8
$\frac{5}{16}$″ ...	12 3	12 5	12 8	13 10
$\frac{5}{16}$″ ...	13 4	13 8	13 11	15 1
$\frac{3}{8}$″ ...	15 9	16 1	16 5	17 8
$\frac{3}{8}$″ ...	13 11	14 3	14 7	15 10
$\frac{1}{2}$″ ...	21 0	21 6	22 0	24 0

Unplasticised.

$\frac{1}{24}$″ ...	6 10	6 11	7 1	7 9
$\frac{1}{16}$″ ...	5 11	6 1	6 2	6 8
$\frac{3}{32}$″ ...	6 8	6 10	7 0	7 8
$\frac{1}{8}$″ ...	7 0	7 2	7 4	8 0
$\frac{5}{32}$″ ...	7 11	8 2	8 4	9 2
$\frac{3}{16}$″ ...	8 11	9 2	9 5	10 5

For current prices, quotes and advice, See Advertisement, Page 70.

ROOF LIGHTING.

"PERSPEX" TRANSPARENT CORRUGATED SHEET.

These transparent sheets are manufactured to match various types of metal and asbestos cement corrugated sheets.

Method of Fixing.—The corrugated "Perspex" sheets are fixed to the roof by the same method as normal corrugated roofing materials.

When "Perspex" sheets to match corrugated iron, 3 in. asbestos or R.P.M. sheets are fitted singly, it is recommended that both sides of the "Perspex" sheet should be fitted above the adjacent sheets. Sheets to match R.P.M. and 3 in. asbestos can be supplied with an additional half lap to enable this method to be adopted.

CORRUGATED "PERSPEX" PER SHEET.

	1—5	6—24	25—49	50—99	100 and over
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
To Match Iron 8/3″—Width 26″.					
36″ ...	3 2 6	3 0 0	2 17 6	2 14 6	2 12 0
48″ ...	4 3 0	3 19 6	3 16 0	3 12 6	3 9 0
60″ ...	5 2 0	4 18 0	4 13 6	4 10 0	4 6 0
72″ ...	6 4 0	5 18 6	5 13 6	5 8 0	5 3 0
84″ ...	7 4 0	6 18 0	6 12 0	6 6 0	6 0 0
96″ ...	8 15 0	8 7 6	8 0 0	7 13 0	7 5 6
To Match Iron 10/3″—Width 32″.					
36″ ...	3 17 0	3 13 6	3 10 6	3 7 6	3 4 0
48″ ...	5 2 0	4 18 0	4 13 6	4 9 6	4 5 0
60″ ...	6 7 6	6 2 0	5 16 6	5 11 6	5 6 0
72″ ...	7 12 6	7 6 0	7 0 0	6 13 6	6 7 0
84″ ...	8 18 0	8 10 6	8 3 0	7 15 6	7 8 0
To Match Asbestos 10½ x 2-5/6″—Width 29″.					
36″ ...	3 8 6	3 5 6	3 3 0	3 0 0	2 17 0
48″ ...	4 11 6	4 7 6	4 4 0	4 0 0	3 16 0
60″ ...	5 13 6	5 9 0	5 4 0	4 19 0	4 14 6
72″ ...	6 16 0	6 10 0	6 4 6	5 18 6	5 13 0
84″ ...	7 18 6	7 12 0	7 5 6	6 18 6	6 12 0
To Match Asbestos Big Six—Width 41½″.					
36″ ...	5 7 6	5 3 0	4 18 6	4 14 0	4 9 6
48″ ...	7 2 6	6 16 6	6 10 6	6 4 0	5 18 6
60″ ...	8 18 0	8 10 6	8 3 0	7 15 6	7 8 0
72″ ...	10 13 0	10 4 6	9 15 6	9 6 0	8 17 6
84″ ...	12 8 0	11 17 6	11 7 2	10 16 5	10 6 6
To Match Asbestos Super Six—Width 43″.					
36″ ...	5 9 0	5 4 6	5 0 0	4 15 0	4 10 6
48″ ...	7 4 0	6 18 0	6 12 0	6 6 0	6 0 0
60″ ...	9 0 0	8 12 6	8 5 0	7 17 0	7 9 6
72″ ...	10 15 6	10 6 6	9 17 6	9 8 6	8 19 0
84″ ...	12 11 0	12 0 6	11 10 0	10 19 6	10 8 6

For intermediate lengths and current prices—

See Advertisement, Page 70.

INSULATION

ACOUSTIC MATERIALS—SOUNDPROOFING—SOUND INSULATION.

The control and manipulation of sound waves within a structure, is effected by the use of sound absorbing materials. These are usually cellular in structure, and the degree of correction is controlled by the type and application of the sound insulation.

Approximate Price.

Acoustic Plaster ... ... at £30 per ton.
,, ,, ½" thickness ... at 12/6 per sq. yard.
"Airlite" Lightweight Insulating Concrete (2" thick) ... ... at 40/- per yard (on roof)

For satisfactory work only reputable firms employing specialist labour should be employed.

Heat Insulation.

Heat is transferred by conduction, convection and radiation, and its control for building purposes is brought about by the application of heat insulation materials, which are interposed between areas in which temperature differentials are required. The degree of control is regulated by the type and application of the heat insulation.

Application can be made by loose fill in granular form in cavities and over plaster ceilings as well as in the form of lightweight concrete for roof decks, cool room floors, etc., or as a plastic material for other purposes.

For satisfactory work only reputable firms should be consulted.

See Advertisement, Page 37a.

INSULATING MATERIALS.

Unifil (loose fill), £42 10s. 0d. per ton.

Uniplastic Lagging, £45 per ton.

Unikast Refractory Concrete—See Advertisement Page 37a.

BUILDING PAPER—SARKING AND INSULATION.

(1) **Sisalkraft**—is a double faced air and waterproof reinforced building paper.

Standard 30-30 and 60-60 :—These grades are used for wall sheathing, roof sarking, bond breaking, insulation protection, dust and draught proofing, concreting and general protective purposes. In widths 3 ft., 4 ft. and 5 ft.

	PRICE			
	Per 300 ft. Roll.			Per Square.
	3 ft.	4 ft.	5 ft.	
30/30 ...	67/10½	90/6	113/1½	7/6½
60/60 ...	78/-	104/-	130/-	8/8

S.K. Hesheen :—A lighter grade used for concrete curing and protection, concrete subgrade lining, lining foundation trenches and general protection during construction.

Rolls 300 ft. by 5 feet wide : 91/10½ per roll ; 6/1½ per square.

S.K. Aluminium foil heat reflectivity and general sarking in 2 grades : Single 25/- per 100 sq. ft. ; Double 37/- per 100 sq. ft.

For further information, booklet and quotes *see*—

Advertisement Page 13.

WROUGHT IRON AND STEEL

MEASUREMENT.

All Smiths' and Cast Work is measured and generally valued by weight. The work should be measured in detail, and the weight ascertained by reference to the various tables given, or by roughly allowing 465lbs. to the foot cube. The patterns for castings are charged extra. The weight of castings may be ascertained from weight of pattern multiplied by table of constants as under for different metals. All screws and bolts—holes drilled, &c., should be *numbered*. Heavy castings should be kept separate from light or ornamental work.

Crestings and railings, &c., are usually taken by *the foot run*.

All work that has to be hoisted must be kept separate and charged for according to handling and height to be raised.

Wrought iron or steel framing work is also measured and charged by weight; all hoisting to be treated as above described. In the case of iron-framed roofs and R.S. joist framing the weight is generally taken and valued according to the amount of work in executing same. In smiths' work, such as railings, guard-bars to windows, &c., the plan is frequently adopted of giving the weight of the metal, reckoning all the labours in addition.

Light Grill and **Open** or **Mesh Work** Panel Work for Elevators, Gates, Staircases and Lift Wells are generally reckoned by the super foot.

Steel Windows and **Casement Frames** by the opening. Rolled steel mesh work generally by the super foot according to work.

MEMORANDA.

Test for Iron.—A soft tough iron, if broken gradually, gives long silky fibres of leaden-grey hue, which twist together and cohere before breaking.

Badly refined iron gives a short blackish fibre on fracture, a very fine grain denotes hard, steely iron, likely to be cold-short.

A medium, even grain, with denser fibres, shows good iron.

Iron remains bright if touched with nitric acid.

Test for Steel.—Good steel in its soft state has a curved fracture and a uniform grey lustre; in its hard state a dull silvery uniform white.

Nitric acid will produce a black spot on steel; the darker the spot the harder the steel.

Cracks, threads, or sparkling particles denote bad quality.

Good steel will not bear a white heat without falling to pieces, and will crumble under the hammer at a bright red heat, while at a middling heat it may be drawn out, under the hammer, to a fine point. Care should be taken that before attempting to draw it out to a point the fracture is not concave, and should it be so, the end should be filed to an obtuse point before operating. Steel should be drawn out to a fine point and plunged into cold water; the fracture point should scratch glass.

To test its toughness, place a fragment on a block of cast-iron; if good, it may be driven by a blow of a hammer into the cast-iron; if poor, it will crush under the blow.

Testing Girders.—The easiest and cheapest way to test girders in pairs is to dig a trench longer and wider than the girders, which are laid in the trench with sufficient space between them to insert an hydraulic lift in the centre, the ends being easily fixed with wooden blocks; by pumping to exactly the pressure required each girder is fully tested.

Approximate weight of Castings from the Pattern.—The weight of pattern in lbs. multiplied by *constants* given, will give the weight of casting in lbs. for the following metals :—

	C. Iron.	Zinc.	Brass.	Copper.	G. Metal.	Lead
White Pine or Deal, dry	14	15	18	19	19	25
Yellow Pine, dried ...	14	14	17·5	18	18	24
Clay dried (model) ...	4	3·8	4·4	4·6	4·6	6
Plaster of Paris, ditto	3·3	3·2	3·7	3·8	3·8	5

Useful Cements.

Rust for Iron.—Wrought iron filings, 65 parts; sal-ammoniac, 2½; sulphur (flowers), 1½; sulphuric acid, 1. Mix dry, sulphuric acid with sufficient water then added.

Iron Pipes.—Wrought-iron filings, 45 parts; clay, 20; china clay, 15; common salt solution, 8. If china clay cannot be found, fireclay will do.

COST OF STEEL.

Per Single Pound at per Ton.

Cost per Ton. £	Cost per Pound. Pennies	Cost per ton. £	Cost per pound. Pennies
10	1·07	21	2·25
11	1·18	22	2·36
12	1·29	23	2·47
13	1·39	24	2·57
14	1·5	25	2·68
15	1·61	26	2·79
16	1·72	27	2·89
17	1·82	28	3·0
18	1·93	29	3·11
19	2·03	30	3·21
20	2·14		

Average diff. per £1 = ·11 pence.

SPIKES.

Weight of 1000 Iron Spikes of different lengths.

	lbs.		lbs.
5 in. long	190	8in. long	525
6in. long	262	9in. long	626
7in. long	375	10in. long	900

HOOP IRON.

Weight & Dimensions.
per foot run.

B.W. Gauge	Width inches	Weight lbs.	B.W. Gauge	Width inches.	Weight lbs.
11	$2\frac{3}{4}$	1·1577	15	$1\frac{3}{8}$	·3334
12	$2\frac{1}{2}$	·9178	16	$1\frac{1}{2}$	·3120
12	2	·7342	16	$1\frac{1}{4}$	·2652
13	$2\frac{1}{4}$	·7123	17	$1\frac{1}{8}$	·2084
13	2	·6332	18	1	·1616
13	$1\frac{3}{4}$	·5540	19	$\frac{7}{8}$	·1237
14	$1\frac{3}{4}$	·4715	20	$\frac{3}{4}$	·0884
14	$1\frac{1}{2}$	·4042	21	$\frac{5}{8}$	·0694
15	$1\frac{1}{2}$	·3637			

HOOP IRON.

$\frac{1}{2}$-cwt. bundle contains.

Wdth. Gge.	feet.	Wdth. Gge.	feet.
$\frac{1}{2}$ x 22	1075	$1\frac{1}{2}$ x 16	155
$\frac{1}{2}$ x 24	1350	$1\frac{1}{2}$ x 18	225
$\frac{3}{4}$ x 20	570	$1\frac{3}{4}$ x 14	130
$\frac{7}{8}$ x 19	425	$1\frac{3}{4}$ x 17	173
1 x 11	340	2 x 14	107
1 x 20	426	2 x 16	124
$1\frac{1}{8}$ x 17	270	$2\frac{1}{4}$ x 13	90
$1\frac{1}{8}$ x 18	300	$2\frac{1}{2}$ x 12	73
$1\frac{1}{4}$ x 16	210	$2\frac{1}{2}$ x 16	107
$1\frac{1}{4}$ x 18	268	3 x 12	59

Weight of Cast Iron Pipes—Water.

Nine Feet Lengths—Spigot & Faucet.

Dia.	Cwts.	Qrs.	lbs.	Dia.	Cwt.	Qrs.	lbs.
$2\frac{1}{2}$″	0	3	2	14″	9	1	26
3″	1	0	10	15″	9	3	26
4″	1	1	16	16″	10	3	6
5″	2	0	14	18″	14	0	25
6″	2	2	0	20″	16	1	20
7″	3	0	20	22″	17	3	2
8″	3	2	14	24″	22	0	0
9″	4	2	10	27″	24	0	21
10″	5	1	0	30″	27	0	0
12″	7	0	0	33″	32	0	0

Ends of Pipes.—The two flanges of a flange pipe, or the faucet end of a socket pipe, are equal in weight to from 8 to 11 in. of the pipe.

WIRE GAUGE NUMBERS AND SIZES.

Gauge No.	Imperial Standard Inches.	Brown and Sharpe Inches.	Birmingham Wire Inches.	United States Standard Inches.
7–0	·500	.....	.....	·5000
6–0	·464	·5800	.....	·4690
5–0	·432	·5165	.....	·4380
4–0	·400	·4600	·454	·4060
3–0	·372	·4096	·425	·3750
2–0	·348	·3648	·380	·3438
0	·324	·3249	·340	·3125
1	·300	·2893	·300	·2812
2	·276	·2576	·284	·2656
3	·252	·2294	·259	·2500
4	·232	·2043	·238	·2343
5	·212	·1819	·220	·2187
6	·192	·1620	·203	·2031
7	·176	·1443	·180	·1875
8	·160	·1285	·165	·1718
9	·144	·1144	·148	·1563
10	·128	·1019	·134	·1406
11	·116	·0907	·120	·1250
12	·104	·0808	·109	·1094
13	·092	·0719	·095	·0938
14	·080	·0648	·083	·0781
15	·072	·0571	·072	·0703
16	·064	·0508	·065	·0625
17	·056	·0453	·058	·0563
18	·048	·0403	·049	·0500
19	·040	·0359	·042	·0438
20	·036	·0320	·035	·0375
21	·032	·0285	·032	·0344
22	·028	·0253	·028	·0313
23	·024	·0226	·025	·0281
24	·022	·0201	·022	·0250
25	·020	·0179	·020	·0219
26	·0180	·0159	·018	·0188
27	·0164	·0142	·016	·0172
28	·0149	·0126	·014	·0156
29	·0136	·0113	·013	·0141
30	·0124	·0100	·012	·0125
31	·0116	·0089	·010	·0109
32	·0108	·0080	·009	·0102
33	·0100	·0071	·008	·0094
34	·0092	·0063	·007	·0086
35	·0084	·0056	·005	·0078

Weight of 100 Bolts and Nuts.
In Lbs. and Decimals.
Length of Bolt in inches.

Heads & Nuts	2	2½	3	3½	4	4½	5	5½	6	6½	7
¼″dia. Hexagon	4·36	5·	5·7	6·3	7·	7·7	8·36	9·	9·7	10·3	11·
¼″dia. Square	4·7	5·4	6·1	6·7	7·4	8·1	8·7	9·4	10·1	10·7	11·4
⅜″dia. Hexagon	11·8	13·4	14·9	16·4	18·	19·6	21·1	22·6	24·2	25·7	27·2
⅜″dia. Square	13·	14·6	16·1	17·6	19·2	20·8	22·3	23·8	25·4	26·9	28·4
½″dia. Hexagon	23·8	26·5	29·3	32·	34·7	37·6	40·2	43·	45·8	48·5	51·2
½″dia. Square	27·4	30·1	32·9	35·6	38·3	41·2	43·8	46·6	49·8	52·1	54·8
⅝″dia. Hexagon	43·8	48·1	52·4	56·7	61·	65·4	69·6	73·9	78·2	82·4	86·7
⅝″dia. Square	49·1	53·4	57·7	62·	66·3	70·7	74·9	79·2	83·5	87·7	92·
¾″dia. Hexagon	67·6	73·	80·	86·1	92·3	98·	104·	111·	117·	123·	129·
¾″dia. Square	79·6	85·	92·	98·1	104·	110·	116·	122·	129·	135·	141·
⅞″dia. Hexagon	106·	114·	123·	131·	140·	148·	156·	165·	173·	182·	194·
⅞″dia. Square	121·	129·	138·	146·	155·	163·	171·	180·	188·	197·	205·
1″dia. Hexagon	153·	164·	175·	185·	196·	208·	218·	229·	240·	251·	262·
1″dia.	174·	185·	196·	206·	217·	229·	239·	250·	261·	272·	283·

Weight of 100 Bolts and Nuts (Continued).
In Lbs. and Decimals.
Length of Bolt in Inches.

	8	9	10	11	12	13	14	15	16	17	18
¼″dia. Hexagon	12·3	13·7	15·	16·3	17·7	19·	20·3	21·7	23·	24·3	25·7
¼″dia. Square	12·7	14·1	15·4	16·7	18·1	19·4	20·7	22·1	24·4	24·7	26·1
⅜″dia. Hexagon	30·3	33·4	36·5	39·5	42·7	45·7	48·9	51·9	55·	58·1	81·2
⅜″dia. Square	31·5	34·6	37·7	40·7	43·9	46·9	50·	53·1	56·2	59·3	82·4
½″dia. Hexagon	56·7	62·3	67·7	73·1	78·8	84·1	89·7	95·3	100·	106·	111·
½″dia. Square	60·3	65·9	71·3	76·7	82·4	87·7	93·3	99·	104·	110·	115·
⅝″dia. Hexagon	95·3	104·	112·	121·	192·	138·	146·	155·	164·	172·	183·
⅝″dia. Square	100·	109·	117·	126·	135·	143·	152·	161·	169·	178·	188·
¾″dia. Hexagon	141·	154·	166·	178·	191·	203·	215·	228·	240·	252·	265·
¾″dia. Square	153·	166·	178·	190·	203·	215·	227·	230·	252·	264·	277·
⅞″dia. Hexagon	211·	227·	240·	257·	278·	201·	307·	324·	340·	358·	379·
⅞″dia. Square	222·	238·	255·	272·	289·	306·	322·	339·	355·	373·	394·
1″dia. Hexagon	283·	305·	326·	348·	370·	391·	413·	435·	456·	478·	500·
1″dia. Square	304·	326·	357·	369·	391·	412·	434·	456·	477·	499·	521·

For over 18 inches long, add for every inch, per gross (or 144 bolts), as under :—

Bolts, inches diam.	⅜	½	⅝	¾	⅞	1
Lbs.	5	8	12	18	24	32

Weight of Round and Square Iron and Steel.

Size (dia.)	IRON.		STEEL.	
	Round Weight per lineal foot	Square Weight per lineal foot	Round Weight per lineal foot	Square Weight per lineal foot
3/16	0·092	0·117	0·094	0·120
1/4	0·164	0·218	0·157	0·213
5/16	0·256	0·326	0·261	0·332
3/8	0·368	0·469	0·376	0·478
7/16	0·501	0·638	0·511	0·651
1/2	0·654	0·833	0·668	0·849
9/16	0·828	1·062	0·845	1·067
5/8	1·023	1·302	1·043	1·328
11/16	1·237	1·576	1·262	1·607
3/4	1·473	1·875	1·502	1·912
13/16	1·728	2·201	1·763	2·245
7/8	2·004	2·552	2·044	2·603
15/16	2·301	2·930	2·347	2·988
1	2·618	3.333	2·670	3·400
1 1/8	3·313	4·219	3·380	4·303
1 1/4	4·091	5·208	4·172	5·312
1 3/8	4·950	6·302	5·049	6·428
1 1/2	5·890	7·500	6·008	7·750
1 5/8	6·913	8·802	7·051	8·978
1 3/4	8·018	10·208	8·178	10·412
1 7/8	9.204	11·719	9·388	11·953
2	10·472	13·333	10·681	13·600
2 1/8	11·82	15·05	12·06	15·35
2 1/4	13·25	16·87	13·52	17·21
2 3/8	14·77	18·80	15·06	19·18
2 1/2	16·36	20·83	16·69	21·25
2 5/8	18·04	22·97	18·40	23·43
2 3/4	19·80	25·21	20·19	25·71
2 7/8	21·64	27·55	22·07	28·10
3	23·56	30·00	24·03	30·60
3 1/4	27·65	35·21	28·21	35·91
3 1/2	32·07	40·83	32·71	41·65
3 3/4	36·82	46·87	37·55	47·81
4	41·89	53·33	42·73	54·40
4 1/4	47·29	60·21	48·23	61·41
4 1/2	53·01	67·50	54·07	68·85
4 3/4	59·07	75·21	60·25	76·71
5	65·45	83·33	66·76	85·00
5 1/2	79·19	100·83	80·78	102·85
6	94·25	120·00	96·13	122·40

TABLE showing the weight of a lineal foot of square and round Bar Iron.

Side and diam. in inches	Square in lbs.	Round in lbs.	Side and diam. in inches	Square in lbs.	Round in lbs.	Side and diam. in inches	Square in lbs.	Round in lbs.
$\frac{1}{4}$	·21	·16	$1\frac{1}{2}$	7·52	5·91	$3\frac{1}{2}$	40·92	32·17
$\frac{5}{16}$	·33	·26	$1\frac{5}{8}$	8·83	6·93	$3\frac{5}{8}$	43·89	34·47
$\frac{3}{8}$	·47	·37	$1\frac{3}{4}$	10·23	8·04	$3\frac{3}{4}$	46·97	36·90
$\frac{7}{16}$	·64	·50	$1\frac{7}{8}$	11·74	9·22	$3\frac{7}{8}$	50·15	39·39
$\frac{1}{2}$	·84	·66	2	13·36	10·50	4	53·44	41·98
$\frac{9}{16}$	1·06	·83	$2\frac{1}{8}$	15·08	11·85	$4\frac{1}{8}$	56·83	44·64
$\frac{5}{8}$	1·31	1·03	$2\frac{1}{4}$	16·91	13·28	$4\frac{1}{4}$	60·33	47·39
$\frac{11}{16}$	1·58	1·24	$2\frac{3}{8}$	18·84	14·80	$4\frac{3}{8}$	63·93	50·21
$\frac{3}{4}$	1·88	1·48	$2\frac{1}{2}$	20·88	16·40	$4\frac{1}{2}$	67·64	53·13
$\frac{13}{16}$	2·21	1·73	$2\frac{5}{8}$	23·12	18·15	$4\frac{5}{8}$	71·45	56·11
$\frac{7}{8}$	2·56	2·01	$2\frac{3}{4}$	25·26	19·84	$4\frac{3}{4}$	75·36	59·19
$\frac{15}{16}$	2·94	2·31	$2\frac{7}{8}$	27·61	21·68	5	83·51	65·59
1	3·34	2·62	3	30·07	23·65	$5\frac{1}{4}$	92·46	72·62
$1\frac{1}{8}$	4·23	3·32	$3\frac{1}{8}$	32·62	25·62	$5\frac{1}{2}$	101·04	79·37
$1\frac{1}{4}$	5·22	4·10	$3\frac{1}{4}$	35·28	27·71	$5\frac{3}{4}$	110·43	86·73
$1\frac{3}{8}$	6·32	4·96	$3\frac{3}{8}$	38·05	29·88	6	120·24	94·61

WEIGHT OF BOLT HEADS AND NUTS IN LBS.

Diam. of Bolts in ins.	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$	3
Weight of Hex. nut and head	·017	·057	·128	·267	·43	·73	1·10	2·14	3·78	5·6	8·75	17·	28·8
Do. Square nut and head	·021	·069	·164	·32	·55	·88	1·31	2·56	4·42	7·2	10·5	21·	36·4

WEIGHT OF A LINEAL FOOT OF CAST-IRON PIPES IN LBS.

Bore inches.	Thickness of Metal.	Weight. lbs.	Bore inches.	Thickness of Metal.	Weight. lbs.	Bore inches.	Thickness of Metal.	Weight. lbs.
3	⅜	12·4	11	½	56·4	22	1⅛	254·9
	½	17·1		⅝	71·0		1¼	284·8
	⅝	22·2		¾	86·4	24	1	245·0
4	⅜	16·1		⅞	101·8		1⅛	276·9
	½	22·1	12	⅝	77·3		1¼	319·3
	⅝	28·3		¾	93·7	27	1	276·0
5	⅜	19·8		⅞	110·4		1⅛	311·0
	½	26·9	1		127·4		1¼	348·0
	⅝	34·4	14	⅝	89·6		1⅜	384·0
6	⅜	23·4		¾	108·4	30	1	305·0
	½	31·9		⅞	127·5		1⅛	345·0
	⅝	40·6	1		147·0		1¼	384·0
	¾	49·7	15	¾	115·7		1⅜	424·0
7	⅜	27·1		⅞	136·1	33	1	335·0
	½	36·8	1		156·8		1⅛	378·0
	⅝	46·7	1⅛		177·7		1¼	421·0
	¾	56·8	16	¾	123·1		1⅜	465·0
8	⅜	30·8		⅞	144·7	36	1⅛	411·0
	½	41·6	1		166·6		1¼	458·0
	⅝	52·8	1⅛		188·7		1⅜	506·0
	¾	64·3	18	1¼	137·9		1½	554·0
9	⅜	34·4		⅞	161·8	42	1⅛	478·0
	½	46·6	1		186·2		1¼	532·0
	⅝	58·9	1⅛		210·8		1⅜	588·0
	¾	71·7	20	⅞	178·9		1½	644·0
10	½	51·4	1		205·8	48	1⅛	544·0
	⅝	65·1	1⅛		232·9		1¼	605·0
	¾	79·0	1¼		260·3		1⅜	669·0
	⅞	93·3	22	1	225·4		1½	733·0

Weight of Metals.—To find the weight in lbs. multiply the cubical inches of zinc by 25, cast iron, tin or white metal by 26, wrought iron or steel by 28, brass by 30, copper or gun metal by 31, lead by 41 ; cut off two figures to the right, the remainder will be lbs.

RECIPE PIPE JOINT.

Cement for Iron Pipe Joints.

Ten pounds of ground litharge, best quality, four pounds of best Paris whiting, one-half a pound of yellow ochre, two pounds of dry red lead, one-half an ounce of hemp cut into half-inch lengths ; mix well with boiled linseed oil to the consistency of thick putty ; make joints in usual way. The above mixture will set quick when heat is applied. It repairs boilers, resists fire, and will set in water.

The Weight per Foot Super of Cast or Wrought Iron.

Thickness	Cast Iron.	Wrought Iron.	Thickness.	Cast Iron.	Wrought Iron.
Inch	lbs.	lbs.	Inch	lbs.	lbs.
1–16	2·35	2·52	$\frac{5}{8}$	23·44	25·20
$\frac{1}{8}$	4·09	5·04	$\frac{3}{4}$	28·12	30·24
$\frac{1}{4}$	9·39	10·08	$\frac{7}{8}$	32·81	35·28
$\frac{3}{8}$	14·06	15·12	1	37·50	40·32
$\frac{1}{2}$	18·75	20·16			

Table showing the Approximate Weight that Given Diameter and Thickness of Metal in Hollow cast iron Columns will support.

The following dimensions are calculated for 10 feet Columns, but may be safely adopted up to 12 feet long.

Outside diameter of column inches.	Thickness of metal inches.	Weight supported tons cwts.	Outside diameter of column inches.	Thickness of metal inches.	Weight supported tons cwts.
3	$\frac{1}{2}$	3 0	8	$\frac{3}{4}$	18 10
	$\frac{3}{4}$	4 10		1	23 15
	1	6 0		$1\frac{1}{4}$	27 10
$3\frac{1}{2}$	$\frac{1}{2}$	3 15	9	$\frac{3}{4}$	22 10
	$\frac{3}{4}$	6 0		1	26 10
	1	7 15		$1\frac{1}{4}$	35 0
4	$\frac{1}{2}$	4 5	10	1	27 10
	$\frac{3}{4}$	7 0		$1\frac{1}{2}$	51 0
	1	9 10	11	1	32 10
$4\frac{1}{2}$	$\frac{1}{2}$	6 0		$1\frac{1}{2}$	55 0
	$\frac{3}{4}$	8 15	12	1	38 0
	1	11 5		$1\frac{1}{2}$	62 10
5	$\frac{1}{2}$	6 10	13	1	47 10
	$\frac{3}{4}$	9 15		$1\frac{1}{2}$	70 0
	1	13 0	14	1	52 10
$5\frac{1}{2}$	$\frac{1}{2}$	7 0		$1\frac{1}{2}$	78 0
	$\frac{3}{4}$	11 5	15	1	56 10
	1	15 10		$1\frac{1}{2}$	85 0
6	$\frac{1}{2}$	8 10	16	1	61 0
	$\frac{3}{4}$	13 0		$1\frac{1}{2}$	90 0
	1	17 10	17	1	65 10
$6\frac{1}{2}$	$\frac{1}{2}$	9 10		$1\frac{1}{2}$	95 0
	$\frac{3}{4}$	14 15	18	1	72 0
	1	20 0		$1\frac{1}{2}$	100 0
7	$\frac{1}{2}$	10 5			
	$\frac{3}{4}$	16 0			
	1	21 10			

TABLE OF THE WEIGHT OF SUPER. FOOT OF METALS IN POUNDS.

Names.	Thickness by the Birmingham Wire Gauge							
	1	2	3	4	5	6	7	8
Iron ...	12·50	12·00	11·00	10·00	8·74	8·12	7·50	6·86
Copper ...	14·50	13·90	12·75	11·60	10·10	9·40	8·70	7·90
Brass ...	13·75	13·20	12·10	11·00	9·61	8·93	8·25	7·54

	Thickness by the Birmingham Wire Gauge.							
	9	10	11	12	13	14	15	16
Iron ...	6·24	5·62	5·00	4·38	3·75	3·12	2·28	2·50
Copper ...	7·20	6·50	5·80	5·08	4·34	3·60	3·27	2·90
Brass ...	6·86	6·18	5·50	4·81	4·12	3·43	3·10	2·75

	Thickness by the Birmingham Wire Gauge.							
	17	18	20	22	24	26	28	30
Iron ...	2·18	1·86	1·54	1·25	1·00	0·80	0·64	0.50
Copper ...	2·52	2·15	1·78	1·45	1·16	0·92	0·74	0·58
Brass ...	2·40	2·04	1·69	1·37	1·10	0·88	0·70	0·55

	Thickness, in parts of an inch.					
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$
Iron ...	2·5	5·	7·5	10·	12·5	15·
Copper ...	2·9	5·8	8·7	11·6	14·5	17·4
Brass ...	2·7	5·5	8·2	10·9	13·6	16·3
Lead ...	3·7	7·4	11·1	14·8	18·5	22·2

	Thickness, in parts of an inch.					
	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Iron ...	17·5	20·	25·	30·	35·	40·
Copper ...	20·3	23·2	28·9	34·7	40·4	46·2
Brass ...	19·0	31·8	27·1	32·5	37·9	43·3
Lead ...	25·9	29·6	37·0	44·4	57·8	59·2

ROLLED STEEL JOISTS.

Weight of Steel Joists, and Self Carrying Load.

A = Depth of Joist. C = Thickness of web.

B = Width of Flange. D = Thickness of Flange.

Dimensions in Inches.				Weight per foot run	Safe Load in Tons Distributed for Clear Spans of						
A	B	C	D	lbs.	6ft.	8ft.	10ft.	12ft.	16ft.	20ft.	30ft.
3	1½	·16	·248	4·0	0·92	—	0·55	0·46	—	—	—
3	3	·20	·332	8·5	2·0	—	1·2	1·0	—	—	—
4	1¾	·17	·24	5·0	1·5	—	0·91	0·76	—	—	—
4	3	·22	·336	9·5	3·1	2·5	1·9	1·6	—	—	—
4¾	1¾	·18	·325	6·5	2·4	—	1·4	1·2	—	—	—
5	3	·22	·376	11·0	4·5	3·6	2·7	2·3	1·7	—	—
5	4½	·29	·448	18·0	7·6	—	4·5	3·8	2·8	—	—
6	3	·26	·348	12·0	5·6	4·5	3·4	2·8	2·1	—	—
6	4½	·37	·431	20·0	9·6	—	5·8	4·8	3·6	—	—
6	5	·41	·520	25·0	12·0	—	7·3	6·0	4·5	—	—
7	4	·25	·387	16·0	9·4	—	5·6	4·7	3·5	2·8	—
8	4	·28	·402	18·0	11·0	—	7·0	5·8	4·3	3·5	—
8	5	·35	·575	28·0	18·0	—	11·0	9·9	7·0	5·5	—
8	6	·44	·597	35·0	23·0	—	14·0	11·0	8·6	7·0	—
9	4	·30	·460	21·0	15·0	—	9·0	7·5	5·6	4·5	—
9	7	·55	·924	58·0	42·0	—	25·0	21·0	16·0	12·0	—
10	5	·36	·552	30·0	24·0	—	14·0	12·0	9·0	7·2	—
10	6	·40	·736	42·0	35·0	—	21·0	17·0	13·0	10·0	—
10	8	·60	·970	70·0	53·0	—	34·0	28·0	21·0	17·0	—
12	5	·35	·550	32·0	30·0	—	18·0	15·0	11·0	9·0	—
12	6	·40	·717	44·0	40·0	—	26·0	22·0	16·0	13·0	—
12	6	·50	·883	54·0	52·0	—	31·0	26·0	19·0	15·0	10·0
14	6	·40	·698	46·0	43·0	—	31·0	26·0	19·0	15·0	10·0
14	6	·50	·873	57·0	59·0	—	38·0	31·0	24·0	19·0	12·0
15	5	·42	·647	42·0	47·0	—	28·0	24·0	18·0	14·0	9·5
15	6	·50	·880	59·0	62·0	—	42·0	35·0	26·0	21·0	14·0
16	6	·55	·847	62·0	73·0	—	45·0	38·0	28·0	22·0	15·0
18	7	·55	·928	75·0	—	—	64·0	53·0	40·0	32·0	21·0
20	7½	·60	1·01	89·0	—	—	83·0	69·0	52·0	41·0	27·0
24	7½	·60	1·07	100·0	—	—	102·0	92·0	69·0	55·0	36·0

Span should not exceed 20 times the depth of single joist.

Example for reading above table :—10 x 8 joist, with thickness web ·60 inch, flange ·97, weighs 70 lb. per foot run. Safe distributed load for 10 feet span is 34 tons ; for 16 feet span, 21 tons. Calculated at quarter the breaking strain.

STRUCTURAL STEEL.

Weight of Rolled Steel Beams and Joists.

Size—Inches	Weight per foot—Lbs.	Size—Inches	Weight per foot—Lbs.
24″ x 7½″	100	10″ x 8″	55
24″ x 7½″	95	10″ x 6″	40
24″ x 7½″	90	10″ x 4½″	25
22″ x 7″	75	9″ x 7″	50
20″ x 6½″	65	9″ x 4″	21
18″ x 6″	55	8″ x 6″	35
16″ x 8″	75	8″ x 4″	18
16″ x 6″	50	7″ x 3½″	15
15″ x 6″	45	6″ x 5″	25
14″ x 5½″	40	6″ x 3″	12
13″ x 5″	35	5″ x 2½″	9
12″ x 8″	65	4″ x 3″	10
12″ x 5″	30	4″ x 1¾″	5
10″ x 8″	70	3″ x 2 21/64″	5·7

Weight of Rolled Steel Channels.

Size—Inches	Weight per foot—Lbs.	Size—Inches	Weight per foot—Lbs.
15″ x 4″	36·37	6″ x 3″	12·41
12″ x 3½″	29·23	5″ x 2½″	10·22
10″ x 3½″	24·46	4″ x 2″	7·09
9″ x 3″	17·46	3″ x 1½″	4·60
8″ x 3″	15·96	3″ x 1¾″	7·58
7″ x 3″	14·22	3″ x 1⅞″	8·855

Weight of Steel Girder Plates, per ft. run.

Thickness	¼in.	5/16in.	⅜in.	½in.	⅝in.	¾in.	⅞in.
Width.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
8 inches ...	7	8⅞	10⅔	14	17¾	21	24¾
9 ,, ...	8	9¾	12	16	19¼	24	27¼
10 ,, ...	8¾	11	13½	17½	22	27	30¾
12 ,, ...	10½	13¼	16	20¾	25½	32	36¾
14 ,, ...	12¼	15¼	18	24½	30	36	42¼
15 ,, ...	13	16½	20	26	33	40	46
16 ,, ...	14	17¾	21⅓	28	35½	42	49½
18 ,, ...	16	19⅞	24	31	38½	48	54½
20 ,, ...	17½	22	27	35	44	54	61½
24 ,, ...	21	26½	32	41½	51	64	72

Weight of Rolled Steel Angle Bars.

Equal Angles—Weight per foot.

Size—Inches	Weight per foot Lbs.	Size—Inches	Weight per foot Lbs.	Size—Inches	Weight per foot Lbs.
8 x 8 x $\frac{5}{8}$	32·68	$3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{1}{4}$	5·74	2 x 2 x $\frac{1}{8}$	1·67
8 x 8 x $\frac{3}{4}$	38·89	$3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{5}{16}$	7·11	2 x 2 x $\frac{3}{16}$	2·43
8 x 8 x $\frac{7}{8}$	45·00	$3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{3}{8}$	8·45	2 x 2 x $\frac{1}{4}$	3·19
8 x 8 x 1	51·01	$3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{1}{2}$	11·05	2 x 2 x $\frac{5}{16}$	3·92
6 x 6 x $\frac{3}{8}$	14·82	$3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{5}{8}$	13·55	2 x 2 x $\frac{3}{8}$	4·62
6 x 6 x $\frac{7}{16}$	17·19	3 x 3 x $\frac{3}{16}$	3·73	$1\frac{3}{4}$ x $1\frac{3}{4}$ x $\frac{1}{8}$	1·46
6 x 6 x $\frac{1}{2}$	19·55	3 x 3 x $\frac{1}{4}$	4·89	$1\frac{3}{4}$ x $1\frac{3}{4}$ x $\frac{3}{16}$	2·11
6 x 6 x $\frac{9}{16}$	21·86	3 x 3 x $\frac{5}{16}$	6·05	$1\frac{3}{4}$ x $1\frac{3}{4}$ x $\frac{1}{4}$	2·76
6 x 6 x $\frac{5}{8}$	24·17	3 x 3 x $\frac{3}{8}$	7·17	$1\frac{3}{4}$ x $1\frac{3}{4}$ x $\frac{5}{16}$	3·39
6 x 6 x $\frac{3}{4}$	28·69	3 x 3 x $\frac{1}{2}$	9·35	$1\frac{3}{4}$ x $1\frac{3}{4}$ x $\frac{3}{8}$	4·02
6 x 6 x $\frac{7}{8}$	33·04	3 x 3 x $\frac{5}{8}$	11·42	$1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{1}{8}$	1·27
6 x 6 x 1	37·40	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{3}{16}$	3·10	$1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{3}{16}$	1·79
5 x 5 x $\frac{5}{16}$	10·30	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$	4·04	$1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{1}{4}$	2·34
5 x 5 x $\frac{3}{8}$	12·28	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{5}{16}$	4·98	$1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{5}{16}$	2·85
5 x 5 x $\frac{1}{2}$	16·16	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{3}{8}$	5·90	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{1}{8}$	1·02
5 x 5 x $\frac{5}{8}$	19·93	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	7·65	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{3}{16}$	1·48
5 x 5 x $\frac{3}{4}$	23·59	$2\frac{1}{4}$ x $2\frac{1}{4}$ x $\frac{3}{16}$	2·77	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{1}{4}$	1·91
4 x 4 x $\frac{5}{16}$	8·17	$2\frac{1}{4}$ x $2\frac{1}{4}$ x $\frac{1}{4}$	3·61	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{5}{16}$	2·34
4 x 4 x $\frac{3}{8}$	9·72	$2\frac{1}{4}$ x $2\frac{1}{4}$ x $\frac{5}{16}$	4·45	1 x 1 x $\frac{1}{8}$	·80
4 x 4 x $\frac{1}{2}$	12·75	$2\frac{1}{4}$ x $2\frac{1}{4}$ x $\frac{3}{8}$	5·26	1 x 1 x $\frac{3}{16}$	1·15
4 x 4 x $\frac{5}{8}$	15·67			1 x 1 x $\frac{1}{4}$	1·49

Size—Inches	Weight per foot Lbs.	Size—Inches	Weight per foot Lbs.	Size—Inches	Weight per foot Lbs.
6½ x 4½ x ⅜	13·54	5 x 4 x 5/16	9·15	3½ x 3 x ⅝	12·49
6½ x 4½ x ½	17·84	5 x 4 x ⅜	11·00	3½ x 2½ x 3/16	3·74
6½ x 4½ x ⅝	22·04	5 x 4 x ½	14·45	3½ x 2½ x ¼	4·89
6½ x 4½ x ¾	26·13	5 x 4 x ⅝	17·80	3½ x 2½ x 5/16	6·05
6 x 4 x ⅜	12·28	5 x 4 x ¾	21·05	3½ x 2½ x ⅜	7·17
6 x 4 x ½	16·16	5 x 3 x ¼	6·60	3½ x 2½ x ½	9·35
6 x 4 x ⅝	19·93	5 x 3 x 5/16	8·17	3 x 2½ x 3/16	3·40
6 x 4 x ¾	23·59	5 x 3 x ⅜	9·72	3 x 2½ x ¼	4·46
6 x 4 x 7/8	27·10	5 x 3 x 7/16	11·30	3 x 2½ x 5/16	5·51
6 x 4 x 1	30·60	5 x 3 x ½	12·75	3 x 2½ x ⅜	6·54
6 x 3½ x 5/16	9·32	5 x 3 x ⅝	15·67	3 x 2½ x ½	8·50
6 x 3½ x ⅜	11·63	4 x 3 x ¼	5·75	3 x 2 x 3/16	3·08
6 x 3½ x 7/16	13·54	4 x 3 x 5/16	7·11	3 x 2 x ¼	4·04
6 x 3½ x ½	15·30	4 x 3 x ⅜	8·45	3 x 2 x 5/16	4·98
6 x 3½ x ⅝	18·86	4 x 3 x 7/16	9·83	3 x 2 x ⅜	5·90
6 x 3½ x ¾	22·31	4 x 3 x ½	11·05	3 x 2 x ½	7·65
6 x 3 x ⅜	11·00	4 x 3 x ⅝	13·55	2½ x 2 x 3/16	2·75
6 x 3 x ½	14·45	3½ x 3 x ¼	5·32	2½ x 2 x ¼	3·16
6 x 3 x ⅝	17·80	3½ x 3 x 5/16	6·58	2½ x 2 x 5/16	4·45
6 x 3 x ¾	21·05	3½ x 3 x ⅜	7·81	2½ x 2 x ⅜	5·26
		3½ x 3 x ½	10·20	1⅜ x 1¼ x ⅛	1·06

Weight of Flat Bar Steel.

In lbs. per Lineal Foot.

Width in inches	Thickness in fractions of an inch.								
	4–16	5–16	6–16	7–16	8–16	10–16	12–16	14–16	1 in.
1	·85	1·06	1·28	1·49	1·70	2·13	2·55	2·98	3·40
1⅛	·96	1·20	1·43	1·67	1·91	2·39	2·87	3·35	3·83
1¼	1·06	1·33	1·59	1·86	2·13	2·66	3·19	3·72	4·25
1⅜	1·17	1·46	1·75	2·05	2·34	2·92	3·51	4·09	4·68
1½	1·28	1·59	1·91	2·23	2·55	3·19	3·83	4·46	5·10
1¾	1·49	1·86	2·23	2·60	2·98	3·72	4·46	5·21	5·95
2	1·70	2·13	2·55	2·98	3·40	4·25	5·10	5·95	6·80
2¼	1·91	2·39	2·87	3·35	3·83	4·78	5·74	6·69	7·65
2½	2·13	2·66	3·19	3·72	4·25	5·31	6·38	7·44	8·50
2¾	2·34	2·92	3·51	4·09	4·68	5·84	7·01	8·18	9·35
3	2·55	3·19	3·83	4·46	5·10	6·38	7·65	8·93	10·20
3¼	2·76	3·45	4·14	4·83	5·53	6·91	8·29	9·67	11·05
3½	2·98	3·72	4·46	5·21	5·95	7·44	8·93	10·41	11·90
4	3·40	4·25	5·10	5·95	6·80	8·50	10·20	11·90	13·60
4½	3·83	4·78	5·74	6·69	7·65	9·56	11·48	13·39	15·30
5	4·25	4·31	6·38	7·44	8·50	10·63	12·75	14·88	17·00
6	5·10	6·38	7·65	8·93	10·20	12·75	15·30	17·85	20·40

WEIGHT OF 100 IRON PAN-HEADED RIVETS IN LBS.

Length under head to point.
Diameter of Rivets in inches.

ins.	5–16 lbs.	6–16 lbs.	7–16 lbs.	8–16 lbs.	9–16 lbs.	10–16 lbs.	12–16 lbs.	14–16 lbs.	1in. lbs.
½	2·06	3·26	4·83	6·82	9·28	12·25	19·94	30·8	43·63
⅝	2·33	3·64	5·35	7·50	10·14	13·32	21·48	32·36	46·36
¾	2·60	4·03	5·87	8·18	11·00	14·38	23·01	34·45	49·09
⅞	2·86	4·41	6·39	8·86	11·86	15·45	24·54	36·54	51·81
1	3·13	4·79	6·92	9·54	12·73	16·51	26·08	38·63	54·54
1¼	3·66	5·56	7·96	10·91	14·45	18·64	29·15	42·80	60·00
1½	4·19	6·33	9·00	12·27	16·18	20·77	32·21	46·98	65·45
1¾	4·73	7·09	10·05	13·64	17·91	22·90	35·28	51·16	70·90
2	5·26	7·86	11·09	14·99	19·63	25·03	38·35	55·33	76·36
2¼	5·79	8·63	12·14	16·36	21·36	27·17	41·42	59·51	81·81
2½	6·32	9·40	13·18	17·73	23·08	29·30	44·49	63·68	87·27
2¾	6·86	10·17	14·22	19·09	24·81	31·43	47·55	67·86	92·72
3	7·39	10·93	15·27	20·45	26·53	33·56	50·62	72·04	98·18
3¼	7·92	11·70	16·31	21·82	28·26	35·69	53·69	76·21	103·63
3½	8·45	12·46	17·36	23·18	29·99	37·82	56·76	80·39	109·08
3¾	8·99	13·23	18·40	24·54	31·71	39·95	59·8	84·56	114·54
4	9·52	14·00	19·44	25·91	33·44	42·08	62·89	88·74	119·99

STRUCTURAL STEEL

IMPORTED STEEL.

With the increasing use of imported steel, Architects and Engineers must provide for the different dimensions of these sections.

Rolled Steel Sections.

In the larger sizes of Rolled Steel Joists, Channels and Angles, it is sometimes difficult to get near metric equivalents and profiles to each size. Therefore, it may be necessary to substitute in plan and specifications, and it would be wise for the purchaser to check on availabilities before completing such plans and specifications. Reinforcing Rod is available in quantities as also are Engineering Rounds and Squares.

The basis price for Rolled Steel Sections, Engineering Rounds and Reinforcing Rods is to the user, approximately £77 0s. 0d. to £90 0s. 0d. per ton.

The basis price of Steel Plate, ordinary Mild Steel, is approximately £90 0s. 0d. to £120 0s. 0d. per ton.

See Advertisements, Pages 76 and 77.

Conversion Tables to Nearest British Weights and Measures—Metric Sections from Germany—Rolled Steel Joists.

Equivalent in millimetres.	Nearest British Measurement.	Lbs. per foot.
80 x 42 x 3·9 m.m. ...	$3\frac{3}{16}''$ x $1\frac{5}{8}''$ x $\frac{1}{8}''$ ...	3·935
100 x 50 x 4·5 ,, ...	$3\frac{15}{16}$ x 2″ x $\frac{3}{16}''$ ...	5·556
120 x 58 x 5·1 ,, ...	$4\frac{3}{4}''$ x $2\frac{5}{16}''$ x $\frac{3}{16}''$ ...	7·405
140 x 66 x 5·7 ,, ...	$5\frac{1}{2}''$ x $2\frac{5}{8}''$ x $\frac{1}{4}''$ ...	9·888
160 x 74 x 6·3 ,, ...	$6\frac{5}{16}''$ x $2\frac{15}{16}''$ x $\frac{1}{4}''$ ...	11·836
180 x 82 x 6·9 ,, ...	$7\frac{1}{8}''$ x $3\frac{1}{4}''$ x $\frac{1}{4}''$ ...	14·48
200 x 90 x 7·5 ,, ...	$7\frac{7}{8}''$ x $3\frac{9}{16}''$ x $\frac{5}{16}''$ ...	17·389
220 x 98 x 8·1 ,, ...	$8\frac{11}{16}''$ x $3\frac{7}{8}''$ x $\frac{5}{16}''$ ...	20·563
240 x 106 x 8·7 ,, ...	$9\frac{7}{16}''$ x $4\frac{3}{16}''$ x $\frac{5}{16}''$ ...	23·935
260 x 113 x 9·4 ,, ...	$10\frac{1}{4}''$ x $4\frac{7}{16}''$ x $\frac{3}{8}''$ ...	27·704
280 x 119 x 10·1 ,, ...	$11\frac{1}{16}''$ x $4\frac{13}{16}''$ x $\frac{3}{8}''$ ...	31·737
300 x 125 x 10·8 ,, ...	$11\frac{11}{16}''$ x $4\frac{15}{16}''$ x $\frac{3}{8}''$ ...	35·837
320 x 131 x 11·5 ,, ...	$12\frac{9}{16}''$ x $5\frac{3}{16}''$ x $\frac{7}{16}''$ ...	40·4
340 x 137 x 12·2 ,, ...	$13\frac{3}{8}''$ x $5\frac{3}{8}''$ x $\frac{1}{2}''$ ...	45·027
360 x 143 x 13 ,, ...	$14\frac{3}{16}''$ x $5\frac{5}{8}''$ x $\frac{1}{2}''$ ...	50·383
380 x 149 x 13·7 ,, ...	$14\frac{15}{16}''$ x $5\frac{7}{8}''$ x $\frac{1}{2}''$ ...	55·54
400 x 155 x 14·4 ,, ...	$15\frac{3}{4}''$ x $6\frac{1}{8}''$ x $\frac{9}{16}''$ ...	61·228
425 x 163 x 15·3 ,, ...	17″ x $6\frac{7}{16}''$ x $\frac{5}{8}''$ ...	68·763
450 x 170 x 16·2 ,, ...	$17\frac{3}{4}''$ x $6\frac{11}{16}''$ x $\frac{5}{8}''$ ...	76·038
475 x 178 x 17·1 ,, ...	$18\frac{11}{16}''$ x 7″ x $\frac{11}{16}''$ ...	84·634
500 x 185 x 18 ,, ...	$19\frac{5}{8}''$ x $7\frac{1}{4}''$ x $\frac{11}{16}''$ ...	93·229
550 x 200 x 19 ,, ...	$22\frac{11}{16}''$ x $7\frac{7}{8}''$ x $\frac{3}{4}''$ ...	110·421
600 x 215 x 21·6 ,, ...	$23\frac{5}{8}''$ x $8\frac{7}{16}''$ x $\frac{7}{8}''$ ...	131·579

PROFILES AND ROLLED COMMERCIAL STEEL FROM FRANCE.

EQUAL ANGLES.

$\frac{1}{2}'' \times \frac{1}{8}''$	$\frac{3}{4}'' \times \frac{1}{8}''$
$\frac{3}{4}'' \times \frac{3}{16}''$	$\frac{7}{8}'' \times \frac{1}{8}''$
$\frac{7}{8}'' \times \frac{3}{16}''$	$1'' \times \frac{1}{8}''$
$1'' \times \frac{3}{16}''$	$1\frac{1}{4}'' \times \frac{1}{8}''$
$1\frac{1}{4}'' \times \frac{3}{16}''$	$1\frac{1}{4}'' \times \frac{1}{4}''$
$1\frac{3}{8}'' \times \frac{1}{8}''$	$1\frac{3}{8}'' \times \frac{3}{16}''$
$1\frac{3}{8}'' \times \frac{1}{4}''$	$1\frac{1}{2}'' \times \frac{1}{8}''$
$1\frac{1}{2}'' \times \frac{3}{16}''$	$1\frac{1}{2}'' \times \frac{1}{4}''$
$1\frac{3}{4}'' \times \frac{5}{32}''$	$1\frac{3}{4}'' \times \frac{3}{16}''$
$1\frac{3}{4}'' \times \frac{1}{4}''$	$1\frac{3}{4}'' \times \frac{5}{16}''$
$1\frac{3}{4}'' \times \frac{3}{8}''$	$2'' \times \frac{5}{32}''$
$2'' \times \frac{3}{16}''$	$2'' \times \frac{1}{4}''$
$2'' \times \frac{5}{16}''$	$2'' \times \frac{3}{8}''$
$2\frac{1}{4}'' \times \frac{3}{16}''$	$2\frac{1}{4}'' \times \frac{7}{32}''$
$2\frac{1}{4}'' \times \frac{9}{32}''$	$2\frac{1}{4}'' \times \frac{1}{4}''$
$2\frac{1}{4}'' \times \frac{5}{16}''$	$2\frac{1}{4}'' \times \frac{3}{8}''$
$2\frac{1}{2}'' \times \frac{1}{4}''$	$2\frac{1}{2}'' \times \frac{5}{16}''$
$2\frac{1}{2}'' \times \frac{3}{8}''$	$2\frac{3}{4}'' \times \frac{1}{4}''$
$2\frac{3}{4}'' \times \frac{9}{32}''$	$2\frac{3}{4}'' \times \frac{5}{16}''$
$2\frac{3}{4}'' \times \frac{3}{8}''$	$2\frac{3}{4}'' \times \frac{7}{16}''$
$2\frac{3}{4}'' \times \frac{1}{2}''$	$3'' \times \frac{1}{4}''$
$3\frac{1}{2}'' \times \frac{1}{4}''$	$3\frac{1}{2}'' \times \frac{5}{16}''$
$3\frac{1}{2}'' \times \frac{23}{64}''$	$3\frac{1}{2}'' \times \frac{7}{16}''$
$3\frac{1}{2}'' \times \frac{3}{8}''$	$3\frac{1}{2}'' \times \frac{1}{2}''$
$4'' \times \frac{1}{4}''$	$4'' \times \frac{5}{16}''$
$4'' \times \frac{3}{8}''$	$4'' \times \frac{13}{32}''$
$4'' \times \frac{7}{16}''$	$4'' \times \frac{1}{2}''$
$4'' \times \frac{9}{16}''$	$5'' \times \frac{3}{8}''$
$5'' \times \frac{1}{2}''$	$5'' \times \frac{9}{16}''$
$5'' \times \frac{5}{8}''$	$5\frac{1}{2}'' \times \frac{7}{16}''$
$5\frac{1}{2}'' \times \frac{1}{2}''$	$5\frac{1}{2}'' \times \frac{9}{16}''$
$5\frac{1}{2}'' \times \frac{19}{32}''$	$6'' \times \frac{3}{8}''$
$6'' \times \frac{1}{2}''$	$6'' \times \frac{9}{16}''$
$6'' \times \frac{5}{8}''$	$6'' \times \frac{13}{16}''$
$6'' \times \frac{3}{4}''$	

EQUAL TEES CHANNELS.

$1\frac{1}{2}'' \times \frac{1}{4}''$	$4'' \times 2''$—7 lbs.
$1\frac{3}{4}'' \times \frac{1}{4}''$	$5'' \times 2\frac{1}{2}''$—10·22 lbs
$2'' \times \frac{7}{32}''$	$6'' \times 3''$
$2'' \times \frac{1}{4}''$	
$2'' \times \frac{5}{16}''$	
$2'' \times \frac{3}{8}''$	

UNEQUAL ANGLES.

$2\frac{1}{2}'' \times 2'' \times \frac{3}{16}''$	$2\frac{1}{2}'' \times 2'' \times \frac{1}{4}''$
$2\frac{1}{2}'' \times 2'' \times \frac{5}{16}''$	$3'' \times 2\frac{1}{2}'' \times \frac{1}{4}''$
$3'' \times 2\frac{1}{2}'' \times \frac{5}{16}''$	$3'' \times 2\frac{1}{2}'' \times \frac{3}{8}''$
$4'' \times 3'' \times \frac{1}{4}''$	$4'' \times 3'' \times \frac{5}{16}''$
$4'' \times 3'' \times \frac{3}{8}''$	

ROLLED STEEL JOISTS.

$3'' \times 3''$	8, 5.
$4'' \times 1\frac{3}{4}''$	4, 25.
$4'' \times 2''$	5
$4'' \times 2$, 66″	
$4'' \times 3''$	8—8, 9 to 11.
$4\frac{3}{4}'' \times 1\frac{3}{4}''$	
$5'' \times 3''$	9—9, 75 to 13.
$5'' \times 4\frac{1}{2}''$	18—19—20.
$5'' \times 4\frac{9}{16}''$	19.
$6'' \times 3''$	10—10, 75 to 14.
$6'' \times 4\frac{1}{2}''$	18—19—20.
$6'' \times 5''$	25.
$7'' \times 4''$	14 to 20.
$8'' \times 4''$	16 to 20.
$8'' \times 5''$	18 to 20
$8'' \times 6''$	35.
$9'' \times 4''$	19 to 24.
$9'' \times 4\frac{1}{2}''$	
$9'' \times 4\frac{25}{32}''$	
$10'' \times 5''$	24 to 35.
$10'' \times 6''$	33, 26—40—41—42
$12'' \times 5''$	32 to 37.
$12'' \times 6''$	44—54.
$12'' \times 6\frac{7}{32}''$	
$14'' \times 6''$	46.
$15'' \times 5''$	42.
$15'' \times 6''$	58, 98.
$16'' \times 6''$	
$18'' \times 7''$	
$20'' \times 7\frac{1}{2}''$	

METRIC SECTIONS AVAILABLE FROM GERMANY.

To Convert to Inches use the Following Approx Fractions.

3 m.m = $\frac{1}{8}$″, 4 m.m. = $\frac{3}{16}$″, 5 m.m. = $\frac{3}{16}$″, 6 m.m. = $\frac{1}{4}$″, 7 m.m. = $\frac{1}{4}$″, 8 m.m. = $\frac{5}{16}$″, 9 m.m. = $\frac{3}{8}$″, 10 m.m. = $\frac{7}{16}$″, 11 m.m. = $\frac{7}{16}$″, 12 m.m. = $\frac{1}{2}$″, 13 m.m. = $\frac{1}{2}$″, 14 m.m. = $\frac{9}{16}$″, 15 m.m. = $\frac{5}{8}$″, 16 m.m. = $\frac{5}{8}$″, 17 m.m. = $\frac{11}{16}$″, 18 m.m. = $\frac{11}{16}$″, 19 m.m. = $\frac{3}{4}$″, 20 m.m. = $\frac{13}{16}$″, 25 m.m. = 1″, 30 m.m. = $1\frac{3}{16}$″, 35 m.m. = $1\frac{3}{8}$″, 40 m.m. = $1\frac{9}{16}$″, 45 m.m. = $1\frac{3}{4}$″, 50 m.m. = $1\frac{15}{16}$″, 55 m.m. = $2\frac{3}{16}$″, 60 m.m. = $2\frac{3}{8}$″, 65 m.m. = $2\frac{9}{16}$″, 70 m.m. = $2\frac{3}{4}$″, 75 m.m. = $2\frac{15}{16}$″, 80 m.m. = $3\frac{1}{8}$″, 90 m.m. = $3\frac{9}{16}$″, 100 m.m. = $3\frac{15}{16}$″, 110 m.m. = $4\frac{5}{16}$″, 120 m.m. = $4\frac{3}{4}$″, 130 m.m. = $5\frac{1}{8}$″, 140 m.m. = $5\frac{1}{2}$″, 150 m.m. = $5\frac{7}{8}$″, 160 m.m. = $6\frac{5}{16}$″, 180 m.m. = $7\frac{1}{16}$″, 200 m.m. = $5\frac{7}{8}$″.

ANGLES—Equal.

20x20x3 or 4 m.m.
25x25x3, 4 or 5 m.m.
30x30x3, 4, 5 or 6 m.m.
35x35x4, 5 or 6 m.m.
40x40x4, 5 or 6 m.m.
45x45x5, 7 or 8 m.m.
50x50x5, 6, 7, or 9 m.m.
55x55x6, 8 or 10 m.m.
60x60x6, 8 or 10 m.m.
65x65x7, 9 or 11 m.m.
70x70x7, 9 or 11 m.m.
75x75x7, 8, 10 or 12 m.m.
80x80x8, 10, 12 or 14 m.m.
90x90x9, 11 or 13 m.m.
100x100x10, 12, 14 or 16 m.m.
110x110x10, 12 or 14 m.m.
120x120x11, 13, 15 or 16 m.m.
130x130x12, 14 or 16 m.m.
140x140x13, 15 or 17 m.m.
150x150x14, 16 or 18 m.m.
160x160x15, 17 or 19 m.m.
180x180x16, 18 or 20 m.m.
200x200x16, 18 or 20 m.m.

ANGLES—Unequal.

20x30x3, or 4 m.m.
20x40x3, 4 or 5 m.m.
30x45x4 or 5 m.m.
30x60x4, 5 or 6 m.m.
40x50x4 or 5 m.m.
40x60x5, 6 or 7 m.m.
40x80x6, 8 or 10 m.m.
50x65x5, 7 or 9 m.m.
50x75x5, 7 or 9 m.m.
50x100x6, 7, 8 or 10 m.m.
55x75x5, 7 or 9 m.m.
65x80x8, 10 or 12 m.m.
65x100x7, 8, 9, 10 or 11 m.m.
65x130x8, 10 or 12 m.m.
75x100x7, 9 or 11 m.m.
75x150x9, 11 or 13 m.m.
80x120x8, 10, 12 or 14 m.m.
80x160x10, 12 or 14 m.m.
90x130x10, 12 or 14 m.m.
90x150x10, 12, 14 or 16 m.m.
100x150x10, 12 or 14 m.m.
100x200x10, 12, 14, 16 or 18 m.m.

Round Corrugated Bars.—$\frac{3}{8}$″, $\frac{1}{2}$″, $\frac{5}{8}$″, $\frac{3}{4}$″, $\frac{7}{8}$″ and 1″.

Square Corrugated Bars.—$\frac{3}{8}$″, $\frac{1}{2}$″, $\frac{5}{8}$″, $\frac{3}{4}$″, $\frac{7}{8}$″, 1″, $1\frac{1}{8}$″ and $1\frac{1}{4}$″.

Flat Bars in all sizes.

For Supplies See Advertisements, Pages 76 and 77.

STRUCTURAL STEEL COSTING.

The cost of structural steel is estimated at per ton or per cwt.

The cost comprises the following items :—

(1) Base Cost of Steel.

(2) Cost of fabrication.

(3) Shop painting during fabrication.

(4) Cost of Erection.

(5) Cartage.

(6) Oncosts and Profit.

The availability of steel at the base cost rate is not always possible at present, so that it is advisable to obtain quotes from steel merchants for a safe price. The following costs are approximate and may serve as a guide for approximate pricing only.

The base cost of steel is shown separately and where imported steel is used, or variations in prices encountered the increased cost must be added to the prices.

For advice and quotes See Advertisement, Pages 65 and 75.

AUSTRALIAN STRUCTURAL STEEL COSTS.

Approximate Nett Costs—Per Ton.

Construction Type.	Cost of Steel	Fabrication.	Erection.	Nett Costs.
Welded Trusses ...	£30	£30 to £35	£7 to £9	£67 to £74
Riveted Trusses ...	£30	£25 to £30	£7 to £9	£62 to £69
Sawtooth Roof ...	£30	£25 to £30	£8 to £10	£63 to £70
R. S. Joists, Stanchions, Beams in Heavy Steel Construction ...	£30	£20 to £25	£8 to £10	£58 to £65
R.S.J. Cut to Length ...	£28	—	£6 to £8	£34 to £36

Cartage, Painting, Oncosts and Profit to be added.

WEIGHT OF STEEL TRUSSES.

The weight of steel trusses varies according to the span and the span-spacings, and whether the truss is a welded or riveted truss.

The following formulae for calculating the approximate weights of welded and riveted trusses, for normal and wide span-spacings, will be found sufficiently accurate for practical purposes.

Normal span-spacings (the distance between spans) up to 14 feet centres.

Wide span–spacings from 15 ft. to 20 ft. centres.

FORMULA " A."

Welded Trusses—Normal Span-Spacings.

W = Weight of truss in pounds.
C = Centres between trusses in feet.
L = Length of span of truss in feet.

$$W = \tfrac{1}{2}\ CL\ \left(1 + \frac{L}{10}\right) \text{ Pounds.}$$

Example :—Welded trusses of 100 feet span, spaced at 14 feet centres in a building 112 feet long.

$$W = \tfrac{1}{2} \times 14 \times 100\ \left(1 + \frac{100}{10}\right)$$

$$W = \frac{1400}{2} \times \frac{11}{1}$$

W = 7,700 lbs. Per Truss = 68·75 cwts.
Total Weight—7 trusses = approximately 482 cwts.

FORMULA " B ".

Riveted Trusses—Normal Spacings.

$$W = \tfrac{5}{8}\ CL\ \left(1 + \frac{L}{10}\right) \text{ Pounds.}$$

Example :—Riveted Trusses—100 ft. span—14 ft. centres in building 112 feet long.

$$W = \tfrac{5}{8} \times 1400\ \left(1 + \frac{100}{10}\right)$$

$$= \frac{7000}{8} \times \frac{11}{1}$$

W = 9625 lbs. per truss = 85·94 cwt.
Total Weight—7 trusses = 601·58 cwts.

FORMULA " C ".

For Trusses with Span—Spacings over 14 feet.

$$W = \tfrac{3}{4}\ CL\ \left(1 + \frac{L}{10}\right) \text{ Pounds.}$$

Example :—Truss 100 ft. span spaced 18 ft. centres in building 108 feet long.

$$W = \tfrac{3}{4} \times 1800\ \left(1 + \frac{L}{10}\right) \text{ Pounds.}$$

$$= \frac{5400}{4} \times 11.$$

W = 14850 lbs = 132·6 cwts per truss.
Total Weight—5 trusses = 663 cwts.

For wider spacings of trusses the purlin sizes must be increased accordingly.

THE STANLEY STREAMLINED ARCH TRUSS.

Designed by Malcolm S. Stanley, A.M.I.E. Aust.
Consulting Engineer, of Sydney.

The economy of steel weight obtained by the use of the " Stanley Arch " truss to wide span buildings, as an alternative to the ordinary fabricated steel truss, will be seen by the weight formula and a comparison of the weight tables of trusses.

FORMULA " D ".

Approximate Weight of " Stanley Truss ".

$$W = \tfrac{3}{16}\ CL\ \left(1 + \frac{L}{10}\right)$$

Example :—A Building 100 ft. span with 14 ft. span spacings.

$$W = \tfrac{3}{16} \times 1400\ \left(1 + \frac{100}{10}\right)\ \text{Pounds.}$$

$$W = \frac{525}{2} \times 11$$

$$W = \frac{5775}{2} = 2888\ \text{Lbs.} = 26\ \text{Cwts.}$$

Normal Spacings of Trusses.
30 feet to 90 feet spans—12 ft. spacings.
100 feet to 150 feet spans—14 ft. spacings.

APPROXIMATE WEIGHTS OF TRUSSES—CALCULATED FROM FORMULAS.

Span in Feet.	Spacing in feet	Welded Truss wgt. in cwts.	Riveted Truss wgt. in cwts.	Stanley Truss wgt. in cwts.
40	12	10·72	12·50	4·02
50	12	16·08	20·1	6·03
60	12	22·50	28·13	8·44
70	12	30·0	37·5	11·17
80	12	38·6	48·22	14·5
90	12	48·22	60·3	18·09
100	14	68·8	85·94	25·8
110	14	82·5	102·7	30·94
120	14	97·5	121·88	36·57
130	14	113·75	142·2	42·66
140	14	131·25	164·07	49·22
150	14	150·0	187·5	56·25

For wider span spacings than 14 feet use Formula " C " for calculating the weights of trusses.

The above weights are for the truss only and do not include Purlin cleats, Plates, etc.

An approximate addition of 10 per cent. on above weights would include all steel accessories.

WEIGHT OF STEEL PURLINS.

Steel purlins weigh from 1½ to 3 pounds per square foot of surface area of roof covered, depending on the spacing centres of the trusses and the snow load if any.

Dimensions of Wood Purlins for various Span-Spacings.

10 ft. Centres, 7″ x 2″—12 ft. centres, 8″ x 2″—14 ft., 9″ x 2″—16 ft., 10″ x 2″.

WEIGHT OF ROOF COVERINGS.

Per Square of Roof Covered.

	Lbs. per sq. ft.
Corrugated Asbestos ¼″	3
,, ,, ⅜″	4·5
,, Steel 22 Gauge	1·5
,, ,, 20 ,, ...	1·8
,, ,, 18 ,, ...	2·3
Tiles	10 to 20
Wood Shingles	2

Note.—In corrugated asbestos cement roofs it is compulsory to underlay No. 10 gauge 6″ mesh matting (ready made in rolls) to minimize a break through.

This is tacked on top of purlins with staples.

Cost approximately, 1/6 per sq. yd. fixed.

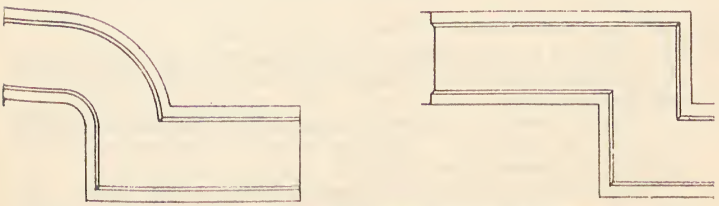
SHOP AWNINGS.

THE CLEARLINE STEEL AWNINGS.

The Clearline Steel Awning represents a major advancement in fascia construction in that it eliminates external rivets, bolts, flat bars, angles and the conventional built-up laminated construction that affords points of moisture and water to start corrosion.

The Clearline steel awning fascia plate is pressed in one-piece from special flanging steel of heavy section in a 1,500 ton hydraulic press. The deep, pressed steel mouldings provide the Clearline Fascia with greater rigidity than the conventional fabricated design and gives more handsome and cleaner " single-run " appearance.

(FACIA STEPS).



CLEARLINE AWNING FASCIAS SHOWING ROUNDED AND SQUARE CORNER STEPS

The fascia corners are one piece pressed—there is no joint at the corner where fascia returns to wall. This also applies to steps for changing awning height and there is no difficulty in meeting the requirements of large radii as may be required on corner awnings. Special methods are adopted for securing the lead flashings.

Altogether there are four types of Clearline awning to meet the particular design requirements.

These are (1) Suspended Awning Box Gutter at Wall; (2) Suspended Awning Box Gutter behind Fascia; (3) Cantilever Awning Box Gutter at Wall and (4) Cantilever Awning Box Gutter behind Fascia.

Load Test of Clearline Awning.—A load test of the Clearline Awning carried out by Mr. J. A. L. Selke, A.R.A.I.A. and Mr. George Mason, A.M.I.E. Aust., provided the following reports :—

Copy of report from Jack A. L. Selke, A.R.A.I.A., A.A.S.T.C.

" This is to certify that I witnessed the testing of your clearline awning on Wednesday, 11th October, 1950 and report as follows :—

Particulars of Awning.

Awning erected for test purposes measured 24′ along fascia with 10′ return fascias, composed of single pressing of $\frac{3}{16}$″ "Weldex" Steel plate, two principal and two intermediate rafters. The principal rafters were located 2′ along from each return fascia.

The principal rafters were supported at points equivalent to suspension rods positions. All rafters at wall ends were supported equivalent to being bolted to a wall or concrete.

Planking bridging the R.S.J. rafters and boiler plate decking was in position to receive the superimposed load. The weight of this planking and boiler plate was more than the equivalent dead load of a ceiling and roof with purlins, ceiling joists, etc.

The Test.

Awning as erected was checked by a levelling device and position accurately noted. A uniformly distributed load of 30 lbs. per sq. ft. (superimposed or live load required by the Standards Association and the Sydney Municipal council for design of awnings) was applied over the entire area of 24′ x 10′.

Levels were taken which disclosed a deflection of three thirty seconds of one inch ($\frac{3}{32}$″) in the centre of the fascia. A uniformly distributed load of 15 lbs. per sq. ft. was then added to the original load giving an overload of 50 per cent.

Levels were again taken and disclosed no further deflection."

(Signed) **Jack A. L. Selke.**

Copy of report from George S. Mason, A.M.I.E. Aust.

" This is to certify that I witnessed setting up of the Awning for test, and checked the original levels taken by Mr. Selke with an independent level.

I also computed the approximated Nett Moment of Inertia of your $\frac{3}{16}$″ standard " Clearline " fascia about x.x. as 170·5 giving a section modulus of 18·95.

I have checked the theoretical deflection of the fascia, considered as a symmetrical section simply supported, and find that it slightly exceeded the actual deflection noted. I am of the

opinion that the connection of the rafters to fascia is sufficient to prevent undue twisting (the test illustrated this).

Although your $\frac{3}{16}$" " Clearline " fascia has not the same gross sectional area, nor the same gross Moment of Inertia about x.x. as the standard riveted design, I am of the opinion that it is basically a better design and will have a longer unprotected life. The calculated stress per square inch in the test did not exceed 9,000 lbs. notwithstanding that the fascia span was as great as permitted by the City Council of Sydney and the live load was 50 per cent. in excess of that required.

(Signed) **George S. Mason.**

Clearline Awning Advantages.—Now, for the first time, architects and construction engineers can confidently specify a steel awning with a fascia practically proof against corrosion and deterioriation due to rusting components. Around the coast particularly—and even inland—it is common to see, on comparatively new awnings, rust streaks emanating from rivet and bolt heads and from the flat bars and angles used to fabricate the old type fascia. With no points for corrosion to start in the Clearline fascia, the Clearline needs less upkeep, maintenance and painting; represents to the owner a form of property protection; to the architect a better awning structurally as well as one of enhanced appearance; and to the builder or contractor simplified erection.

The rigidity of the Clearline Awning fascia enables a ceiling to be firmly fixed without springing the fascia out of alignment as frequently happened with the old type fabricated fascia.

General Specification Data.
Suburban and Country Use
By the Courtesy of
J. MURRAY STEELWORKS PTY. LTD.,
AUBURN, N.S.W.

All awnings must comply with the governing Municipal or Shire Building Inspector's requirements.

Design.—This depends on the type of building and the locality.

Specification.—Sizes of material and other details have to be considered in relation to the individual requirements of each awning.

Anchorage.—As required to suit design of awning and type of building. Check for special requirements of Municipal Councils.

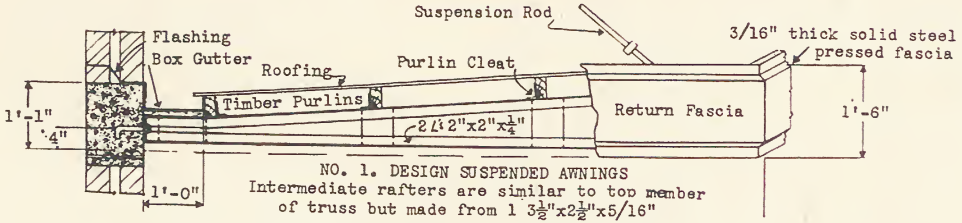
Height from Kerb.—Keep to uniform height as near as possible, approximately 11 ft. from kerb and line up with adjoining awnings. When fascia height increases from 12 ft. to 13 ft. from kerb due to sloping ground, the fascia should step down and restart at about 11 ft.

Kerb Line.—Awning may be required to stand back 2 ft. from line of kerb and fascia usually follows the line of kerb around corners.

Types and Design.—This refers to the steelwork and structure only and no particulars are given for such trades as carpenters, plumbers, ceiling fixers, painters, etc.

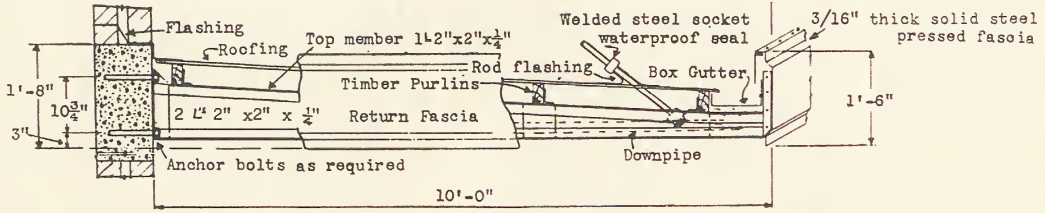
1. Suspended Awning, Box Gutter at Wall.
2. Suspended Awning, Box Gutter behind fascia.
3. Cantilever Awning, Box Gutter at Wall.
4. Cantilever Awning Box Gutter behind Fascia.

No. 1 DESIGN SUSPENDED AWNING.



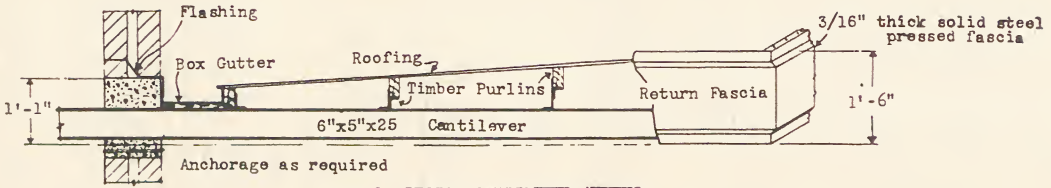
NO. 1. DESIGN SUSPENDED AWNINGS
Intermediate rafters are similar to top member of truss but made from 1 $3\frac{1}{2}$"x$2\frac{1}{2}$"x5/16"

No. 2 DESIGN SUSPENDED AWNING.



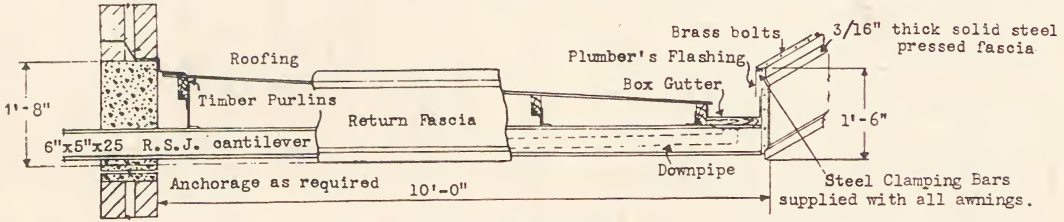
HIDDEN GUTTER SUSPENDED AWNING
Details of eye bolts & intermediate rafters similar to No. 1. Design

No. 1 DESIGN CANTILEVER AWNING.



No. 1. DESIGN CANTILEVER AWNING

No. 2 DESIGN CANTILEVER AWNING.



HIDDEN GUTTER CANTILEVER AWNING

Types Applicable to Particular Buildings.—No. 1 Suspended Awning is suited to either single or two storey buildings, but care should be given to anchorage. For single storey buildings, or where brickwork is insufficient to allow the building-in of long awning bolts, it will be necessary to use back stays. The fascia plate of this awning returns to the wall at each end, depth of fascia top to bottom being 18 ins.

No. 2 Suspended Awning.—With the box gutter behind the fascia, is very suitable for single storey buildings as the extra depth of the trusses at the wall where anchored back with long awning bolts considerably relieves the strain on the suspension rods and eye bolts. The fascia depth is 18 ins. and returns to the wall at each end.

No. 3 Cantilever Awning.—With box gutter at wall is generally only suited to buildings designed to incorporate cantilevers as no suspension rods are used. The Cantilevers are built into the brickwork or into concrete and encased as beams below the floor slab ceiling inside the building. Where the floor slab is too high to suit the awning height, a false ceiling may be used to cover the cantilevers.

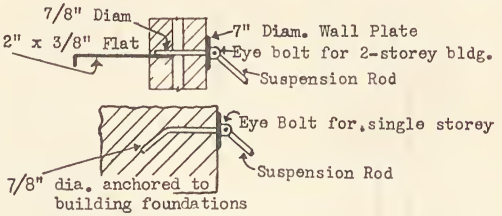
There are various ways cantilevers may be used even when conditions appear difficult and the appearance of this type of awning looks well on large buildings. The fascia plate is 18 in. deep and returns to the wall at each end.

No. 4 Cantilever Awning.—with box gutter behind fascia is generally as explained for No. 3 so far as requirements for building into walls, etc. Fascia depth is 18 in. and returns to the wall at each end.

GENERAL DATA.

Trusses should be approximately 18 ft. apart and intermediate rafters not more than 9 ft. from trusses or cantilevers.

EYE BOLTS.



Eye Bolts.—Should be approximately 7 ft. from awning roof on awnings of 10 ft. projection but where this height is not available, as in single storey buildings, the height may be varied. However, 3 ft. 6 in., is the minimum height and it must be remembered that low eye bolts require very good anchorage. Flashing as required for box gutter or roofing to be fixed into the building. Where box gutter is at wall 13 in. above bottom of fascia and 4 in. out from wall; where gutter is behind fascia 20 in. above bottom of fascia level and 10 in. out from wall.

COSTING.

The Clearline Awning, despite its many advantages, costs no more than old type awnings with fabricated fascias. Owing to awnings not being a stock item, detailed prices can only be given when particulars are supplied for each individual awning but the following

approximate prices will give an indication of the general costs of Awnings.

Prices do not include back stays and steps, but include return ends.

Small Frontage Awnings from 100/– per foot run.

Large Frontage Awnings from 70/– per foot run.

For further particulars and quotes See Advertisement, Page 78.

ECONO-STEEL (Patented nailable steel) LUMBER for Building Frames, ECONO-TILES, ALUMINIUM WALL SIDING, Etc. for INDUSTRIAL and DOMESTIC STRUCTURES.

" Econo-Steel " framing is an Australian patented, nailable steel technique, using 16-gauge sheet steel. This is processed and bent to box-like sections, which are extraordinarily strong, as will be seen by reference to Railway Dept's. tests. Sections are immersed in rust-inhibiting " Sealex " before delivery and clearly marked.

All jointing and assembly is carried out by the simplest mechanical means, using only a hammer and spanner. Over 1,700 " Econo-Steel " structures have been built to date, and the product has found its forte in repetitive work, such as large factories, industrial housing, hostels, colleges, etc.

The Econo-Steel Co. has introduced nailable steel lumber in lieu of timber and heavier structural steel to very great advantage, and in most cases at a lesser cost. Highlights, however, are the speed with which trained riggers assemble and complete the frames, the sturdiness of the finished job, and the final low cost.

RANGE OF DESIGNS.

Apart from homes in individual and mass-housing schemes, " Econo-Steel " is today accepted as standard practice for such structures as Technical Colleges, factories, office blocks, municipal garages, nurseries, glass houses, paint stores, shearers' quarters and bunk-houses, wool-sheds, machinery-sheds, overseas missions and managers' residences, church and scout halls, exhibition pavilions, garages, caravan parks, shops and roadside agencies, amenities blocks, stores, Commonwealth Bank premises, kindergartens, soldiers' halls, drying rooms, barracks, and hostels. Some of the last-mentioned assume large proportions, and the above-mentioned range of types have been built in N.S.W., Queensland, other States, and overseas.

WEIGHT AND PORTABILITY.

" Econo-Steel " is approximately 25 per cent. to 75 per cent. lighter than corresponding timberwork. In packing for consignment overseas, or interstate, the hollow character of the units permits a very great reduction in bulk. There are no losses in transporting, and the members are easily identifiable and located.

Rising costs of timber and structural steel and labour are offset by using steel in this nailable, pressed and hollow form. Strength is maintained. For instance, a 12′–0″ long 16-gauge pressed steel column or stanchion, $3\frac{1}{2}''$ x $3\frac{1}{2}''$ section, may be site filled with concrete and give a greater load bearing value than considerably heavier timber, or structural steel sections, and at a fraction of the cost.

" Econo-Steel " uses steel to maximum advantage.

Note.—Labour erection cost approx. 5/– per lin. ft. run of walling, including roof trusses for Metropolitan Area.

For further information See Advertisement, Page 1.

METAL WORK

METAL WINDOWS AND DOORS.

Metal windows, doors and frames for industrial and residential buildings, are becoming increasingly popular in building practice. They have the following advantages over timber construction :—

(1) Less fixing and maintenance costs.
(2) Elimination of sagging, jamming and deterioration.
(3) Less fire risk.

They are manufactured complete with frame, hinges and Florentine bronze fittings in standard sizes. Roller type fly screens can be fitted if required.

Glazing :—Sashes are prepared for pin and putty glazing, or metal glazing beads can be fitted to conform to F.U. Regulations. When ordering glass, specify for steel frames as wood sash putty is not suitable for metal frames.

STEEL WINDOW FRAMES AND SASHES—STANDARD SIZES—(UNGLAZED).

Large Sizes have 2 Casements with Middle Panel fixed.

Size	Price	Zinc Spray Extra	Size	Price	Zinc Spray Extra
	s. d.	s. d.		s. d.	s. d.
4′–3⅛″x2′–0¾″...	80 0	30 0	5′–4″x2′–0¾″...	100 0	34 0
4′–3⅛″x4′–0″ ...	150 0	48 0	5′–4″x4′–0″ ...	185 0	52 0
4′–3⅛″x6′–8⅞″...	193 0	60 0	5′–4″x6′–8⅞″...	240 0	60 0
4′–3⅛″x8′–3⅝″...	210 0	65 0	5′–4″x8′–3⅝″...	260 0	80 0
3′–5½″x2′–0¾″...	73 0	28 0			
3′–5½″x4′–0″ ...	143 0	38 0	Chrome Handles, 3/– extra.		
3′–5½″x6′–8⅞″...	188 0	50 0	Chrome Stays, 3/6 extra.		

CURVED CORNER FRAMES—UNGLAZED.

Size 4′–3⅛″x4′–0″—Radius 2′–7½″, £7 5s. 0d. ; Zinc Spray, £2 3s. 0d. extra.

Size 5′–4″x4′–0″—Radius 2′–7½″, £9 0s. 0d. ; Zinc Spray, £2 7s. 0d. extra.

Circular Frame Fixed—2 ft. diam., £3 8s. 0d. ; Zinc Spray, £1 6s. 0d. extra.

STEEL FRENCH DOORS—STANDARD SIZES—UNGLAZED.

Single Door, 7′–0⅞″x2′–0¾″, £4 3s. 0d. ; Zn. Spray, 45/–.

Double Doors, 7′–0⅞″x4′–0″, £16 0s. 0d. ; Zn. Spray, 73/–.

Double Doors—Side Lights, 7′–0⅞″x8′–1¾″ £27 10s. 0d. ; Zn. Spray, 160/–.

STANDARD ALUMINIUM WINDOW FRAMES.

For Brick Buildings.

Size	Price Unglazed	24 oz. Glass	Labour Fitting Glass
	£ s. d.	£ s. d.	s. d.
3′–5″ x 1′–8½″—1 Light	6 10 0	14 0	7 0
3′–5″ x 2′–5½″—1 „	7 0 0	19 0	7 0
3′–5″ x 4′–0¼″—2 „	11 0 0	1 12 0	12 9
3′–5″ x 4′–9⅝″—2 „	11 10 0	1 17 6	12 9
3′–5″ x 6′–4⅜″—3 „	15 10 0	2 10 6	18 0
3′–5″ x 7′–0¾″—3 „	16 0 0	2 13 6	18 0
3′–5″ x 8′–7½″—4 „	20 0 0	3 8 6	24 0
4′–6½″ x 1′–8½″	7 5 0	17 6	7 0
4′–6½″ x 2′–5½″	7 10 0	1 3 0	7 0
4′–6½″ x 4′–0¼″	12 10 0	2 0 0	12 9
4′–6½″ x 4′–9⅝″	13 0 0	2 5 6	12 9
4′–6½″ x 6′–4⅜″	17 15 0	3 2 0	18 0
4′–6½″ x 7′–0⅜″	18 0 0	3 7 0	18 0
4′–6½″ x 8′–7½″	22 10 0	4 4 6	24 0

SIDE MEMBERS AND MULLIONS—COST EACH—FOR TIMBER FRAMED CONSTRUCTION.

Length	Sides	Mullions
	£ s. d.	£ s. d.
2′–0″	2 10 0	3 0 0
2′–6″	2 12 0	3 5 0
3′–0″	2 15 6	3 10 0
3′–6″	2 17 6	3 15 0
4′–0″	3 0 0	4 0 0
4′–6″	3 5 0	4 5 0

24 oz. glass, 1/7 per sq. foot—Polishing edges, 10d. per foot. Fitting Handles, 3/6 per frame—Installing Glass, 10/– per frame.

STAINLESS STEEL SINK UNITS.

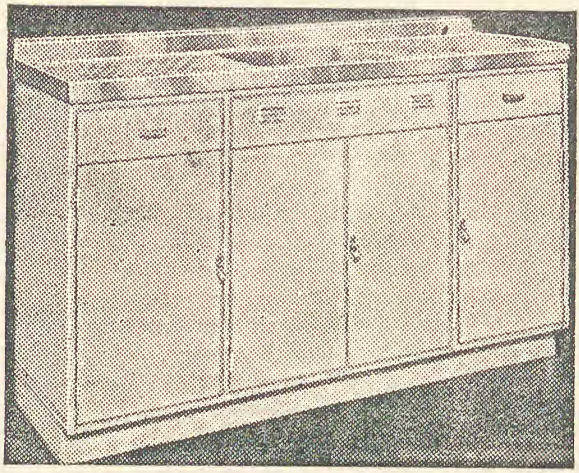
Stainless steel sinks are manufactured in sizes 4 ft., 4 ft. 6 in., 5 ft. and 6 ft. lengths, by 18 in. wide, with bowl 18″ x 13″ x 6½″ deep. Units are backed with timber to simplify installation. Bowls right or left handed as desired in the 4 ft. sizes.

Approximate Prices—Delivered Sydney.

	4 ft.	4 ft. 6 in.	5 ft.	6 ft.
" Wunderbrite " Finish	£17	£18	£19	£22

Country Orders : Cases and packing extra at cost, F.O.R. Sydney net.

COMPLETE STAINLESS STEEL KITCHEN UNIT.



The kitchen unit comprises a stainless steel sink and drainer mounted on a cabinet of furniture steel finished in cream or green synthetic oven-baked enamel.

Standard size, 5 feet long, 18″ wide, and 3 ft. high.

Drawer and cupboard fittings chromium plated.

Price " Wunderbrite " finish, £34 10s. 0d. each.

Delivered Metropolitan areas—Country : Cases and packing extra at cost. F.O.R. Sydney Net.

For current quotes See Advertisement, Inside Front Cover.

CAST VENTILATORS IN BRASS, BRONZE, OR SILVERITE—EACH.

Add 27 per cent Surcharge

Size of Opening	Fine Emeried	Extra for Polishing or Oxidising	Size of Opening	Fine Emeried	Extra for Polished or Oxidising
9″ x 3″	7/6	2/–	7½″ x 4½″	7/–	1/9
11½″ x 5½″	11/–	2/3	9″ x 6″	7/6	2/3
9″ x 3″	7/6	2/3	9″ x 6″	12/6	2/6
9″ x 3″	7/6	2/3	6½″ x 6½″	11/3	2/–
9″ x 3″	7/6	2/3	18¼″ x 5⅞″	16/6	3/6
10¾″ x 3″	10/–	2/6	20¾″ x 7″	17/–	3/6
7″ x 4½″			23¾″ x 5″	21/–	3/6
(Overall)	6/–	1/9	24½″ x 3″	17/6	3/6
9″ x 6″	11/–	2/6	9½″ x 3¼″	7/6	2/3

METAL VENTILATORS (PER DOZEN).

Add 27 per cent. Surcharge.

	Size of Opening	Stock Sizes. With Box.	Without Box.
Galvanised Steel Louvre	9″ x 6″ ...	9 0	
Galvanised Steel Louvre (Fly Wire at back)	... ...	14 0	
Cast Zinc Louvre	9″ x 6″ ...	2 16 0	
Open Vent	9″ x 3″ ...	1 4 9	14 9
Hit or Miss, with knob	9″ x 3″ ...	1 14 0	1 4 0
Hit or Miss, with Bakelite knob	9″ x 6″ ...	1 13 6	1 0 0
Hit or Miss, with Swivel	9″ x 6″ ...	1 13 6	1 0 0
Open Vent, Steel	9″ x 6″ ...	1 1 0	7 6
Open Vent, Galvanised	9″ x 6″ ...	1 1 0	7 6
Open Vent, Zinc	9″ x 6″ ...		19 6
Open Vent, Zinc	9″ x 6″ ...		19 6
Open Vent, Copper	6″ x 3″ ...		2 2 0
In Zinc	... ...		1 10 0
Open Vent, Steel	9″ x 3″ ...		6 3

Size 4″ x 2″ Steel (Painted), 7/6; (Ducoed), 10/6; Monel Metal (Polished), 2/4 each.

Cast Aluminium Louvre, 9″ x 6″, £2/3/6 per doz.

Cast Aluminium Letter Box Front, 9″ x 6″, 10/9 each.

METAL VENETIAN BLINDS.

Aberdeen Patented All Metal Flexible Venetian Blinds.

The Aberdeen patented all metal Venetian blind was the first all metal blind with enclosed head box introduced into Australia. The advantages are numerous and include ease of erection made possible by the universal end brackets which require only two screws to be put in position and enable the blind to be removed from its fittings whenever required. The tilting device has an inbuilt equaliser keeping the pull cords always equal. When the slats have been adjusted they will remain so until altered. The pull cord automatically raises, lowers or locks the blind in any desired position whilst the hold down brackets eliminate all noise and reduce vibration to a minimum. The slats are bow shaped made from special alloy metal and because of their contour provide the maximum air currents.

These slats can never sag and never require painting and when bent immediately snap back into their original position. These blinds occupy only a quarter of the space when pulled up of ordinary blinds.

All metal Venetian blind provides the maximum of air conditioning, instant control of light and with reasonable care necessitate no upkeep costs.

Cleaning is reduced to a minimum, just a flick of a feather duster is all that is necessary.

Available in various widths and drops to suit all openings.

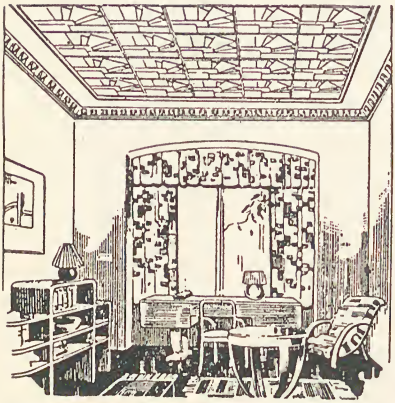
Approximate Prices.

Sizes to 12 Square Feet, £4 4s. 6d. each.

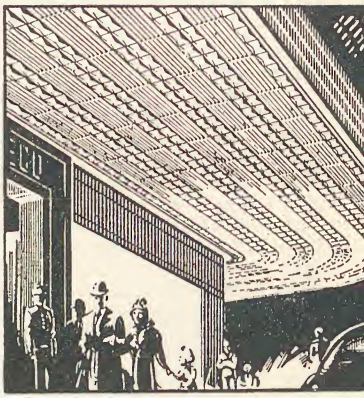
Larger Sizes allow approx. 7/3 per square foot.

See Advertisement, Page 47.

WUNDERLICH ART METAL CEILINGS.



Interior Ceiling



Awning Ceiling

Note.—When ordering specify steel (for interiors) or galvanized (for awnings and exterior use).

With every ceiling a working drawing is supplied, showing the correct set out of battens and metal ceiling materials to the specified area.

When ordering, a dimensioned plan of the room to be ceiled should be submitted, showing the direction of ceiling joists, and projections such as chimney breasts, piers, etc.

Quotes for supplying and fixing complete ceilings are given by Manufacturers and carried out by expert fixers.

See Manufacturer's ADVERTISEMENT, INSIDE FRONT COVER.

METAL CEILINGS ONLY—CORNICES EXTRA.
PRICE PER SQUARE YARD—UNFIXED.
Add 27 per cent. Surcharge to Prices Below.

	Steel Ceiling Materials	Galvanised Ceiling Materials
Suite Design 1560–1561	3/9 sq. yd.	4/5 sq. yd.
,, ,, 1575–1577	3/9 ,,	4/5 ,,
,, ,, 1623–1624	3/9 ,,	4/5 ,,
,, ,, 1774/1775	3/9 ,,	4/5 ,,
Panellings 1501, 1807, 1808	3/8 ,,	4/3 ,,
,, 1683, 1684, 1787, 1802 ...	3/8 ,,	4/3 ,,
,, 1811	3/8 ,,	4/3 ,,
,, 1705, 1777, 1805	3/6 ,,	4/1 ,,
,, 1785	3/8 ,,	4/3 ,,
,, 1567, 1588, 1700	3/4 ,,	3/11 ,,
,, 1485	3/8 ,,	4/3 ,,
Suite 1435, 1436, 1437	4/– ,,	4/9 ,,

PRICES PLUS 27 PER CENT. SURCHARGE.

Steel Cornices—In stock lengths of 6 feet.

Nos.	Girth	6 ft. Length	Nos.	Girth	6 ft. Length	Nos.	Girth	6 ft. Length
878	3″	1/4½	1701	8″	2/11	1751	5¾″	2/2
933	3″	1/4½	1708	4¾″	1/11	1756	6″	2/3
1172	2¾″	1/3½	1748	9″	3/3	1757	8″	3/1
145	11½″	4/1	1749	3″	1/4½	1780	9″	3/3
1625	8½″	3/1	1750	8¾″	3/2	1786	3″	1/4½
1685	6½″	2/5						

Wood Brackets to suit various Cornices are 1/12th the price of a 6 ft. length of corresponding Cornice. Mitre leaves are reckoned at the price of one foot of the corresponding cornice.

METAL LETTERS AND NUMERALS.



METAL LETTERS TO SPECIAL DESIGN.

The examples of modern Metal Letters illustrated at left are representative only of the large variety of types that can be BUILT from Sheet Metal of Stainless Steel, Bronze, Zinc, etc., or CAST in Bronze, Aluminium Alloy or Zinc, and finished to give any desired effect.

MODERN BLOCK TYPE—BUILT, CAST AND ENAMELLED.

All Prices include Bolts for Fixing.
Stops and Commas are charged at one-fifth of the price of the metal letter for which they are required.
Add 27 per cent. Surcharge and 8½ per cent. Sales Tax to Prices

Cast—Standard Modern Block.

Height	Approx. Projection	Zinc or Aluminium as Cast each	Aluminium Polished or Satin Finish each	Bronze Emeried Faces each	Bronze Chromium Plated Polished each	Bronze Patina Finish each
4″	5/16″	3/6	4/9	5/–	7/6	5/3
6″	5/16″	4/–	6/–	6/6	9/6	7/–
9″	⅜″	5/–	7/–	8/6	13/6	9/–
12″	7/16″	6/3	9/–	12/–	18/–	13/–

Vitreous Enamelled—Standard Modern Block.—Available with infills of the following rich, fadeless, ceramic glazes: Soft White, Ivory, Belgian Yellow, Orange, Light Red, Dark Red, Purple, Brown, Pea Green, Malachite Green, Chrome Green, Oriental Turquoise Blue, Cobalt Blue, Dove Grey, Ebony Black.

Height	Approx. Projection.	Metal Natural Colour each	Metal Polished Chromium Plated each
4″	$\frac{5}{16}$″	7/6	10/3
6″	$\frac{5}{16}$″	10/3	14/–
9″	$\frac{3}{8}$″	14/6	20/–
12″	$\frac{7}{16}$″	20/–	27/6

Built—Standard Modern Block.

Height	Approx. Projection	Zinc. Natural Colour each	Copper or Brass Natural Colour each	Copper Patina Finish each
5″	$\frac{5}{16}$″	3/9	5/–	5/9
6″	$\frac{5}{16}$″	4/–	5/6	6/3
7″	$\frac{3}{8}$″	4/3	6/–	6/9
9″	$\frac{3}{8}$″	5/–	7/3	8/3
12″	$\frac{7}{16}$″	6/3	10/–	11/6
15″	$\frac{1}{2}$″	8/–	13/6	15/6
18″	$\frac{5}{8}$″	10/–	17/6	20/–
24″	$\frac{3}{4}$″	15/3	28/–	32/–

METAL LETTERS AND NUMERALS.
RENAISSANCE TYPE—BUILT, CAST AND ENAMELLED.

Add 27 per cent. Surcharge and 8½ per cent. Sales Tax.
All Prices Include Bolts for Fixing.
Stops and Commas are charged at one-fifth of the price of the metal letter for which they are required.

Cast—Standard Renaissance.

Height	Approx. Projection	Zinc or Aluminium As Cast each	Aluminium Polished or Satin Finished each	Bronze Emeried Faces each	Bronze Polished Chromium Plated each	Bronze Patina Finish each
2″	$\frac{3}{16}$″	3/3	3/9	4/6	6/3	4/9
3″	$\frac{1}{4}$″	3/9	4/6	5/–	7/–	5/3
4″	$\frac{5}{16}$″	4/3	5/3	5/6	8/–	5/9
5″	$\frac{5}{16}$″	4/9	6/3	6/9	9/6	7/–
6″	$\frac{5}{16}$″	5/–	7/–	7/6	10/9	8/–
7″	$\frac{3}{8}$″	5/3	7/3	8/–	11/6	8/6
9″	$\frac{3}{8}$″	6/–	8/3	9/6	14/6	10/–
10″	$\frac{7}{16}$″	6/6	9/–	10/6	16/–	11/3
12″	$\frac{7}{16}$″	7/3	10/3	12/6	18/9	13/6
15″	$\frac{1}{2}$″	11/6	15/3	25/–	35/–	26/6
18″	$\frac{5}{8}$″	16/6	21/–	35/–	50/–	37/6

METAL LETTERS AND NUMERALS.

Vitreous Enamelled—Standard Renaissance.—Available with infills of the following rich, fadeless, ceramic glazes: Soft White, Ivory, Belgian Yellow, Orange, Light Red, Dark Red, Purple Brown, Pea Green, Malachite Green, Chrome Green, Oriental Turquoise Blue, Cobalt Blue, Dove Grey, Ebony Black.

Height	Approx. Projection	Metal Natural Colour each	Metal Polished Chromium Plated each
2″	3/16″	6/–	8/3
3″	1/4″	6/9	9/3
4″	5/16″	7/6	10/3
5″	5/16″	9/–	12/3
6″	5/16″	10/3	14/–
7″	3/8″	12/–	16/6
9″	3/8″	14/6	20/–
10″	7/16″	16/–	22/6
12″	7/16″	20/–	27/6
15″	1/2″	37/6	51/9
18″	5/8″	54/–	74/–

Built—Standard Renaissance.

Height	Approx. Projection	Zinc Natural Colour each	Copper or Brass Natural Colour each	Copper Patina Finish each
5″	5/16″	4/9	6/–	6/9
6″	5/16″	5/–	6/6	7/3
7″	3/8″	5/3	7/–	7/9
9″	3/8″	6/–	8/6	9/6
12″	7/16″	7/3	11/–	12/6
15″	1/2″	9/–	14/6	16/6
18″	5/8″	11/–	18/6	21/–
24″	3/4″	16/3	29/–	33/–

For metal letters, memorial tablets, nameplates, directory boards, etc., in bronze (with coloured vitreous enamel infills), in brass, stainless steel, etc., finished to individual requirements.

SEE ADVERTISEMENT, INSIDE FRONT COVER.

MELTING POINTS OF METALS.

	Deg. Fahr.		Deg. Fahr.
Aluminium (pure) ...	1,289	Mercury	—39
Antimony	810	Nickel	2,810
Bismuth	510	Platinum	3,080
Brass	1,650	Steel (hard)	2,570
Silver	1,733	Steel (mild)	2,687
Gold	1,913	Tin	446
Iron (cast) ...	1,920 to 2,012	Zinc	779
Iron (wrought) ...	2,912	Copper	1,929
Lead	612		

COPPER AND ITS ALLOYS.

Metal Manufactured.	Copper.	Zinc.	Nickel.	Tin.	
German Silver	60%	20%	20%	—	100 pts.
White Metal	56%	5%	39%	—	100 pts.
Gun Metal	90%	—	—	10%	100 pts.
Bell Metal	80%	—	—	20%	100 pts.
Rolled Brass	60%	40%	—	—	100 pts.
Flexible Bronze	95%	—	—	5%	100 pts.

SHRINKAGE OF CASTINGS.

Aluminium, Brass, Copper, Zinc	$\frac{3}{16}$ in.	Tin	1/12 in.
Cast Iron, and Lead ...	$\frac{1}{8}$"	Steel	$\frac{1}{4}$ in.

APPROXIMATE WEIGHT OF ONE CUBIC INCH OF VARIOUS METALS.

	lbs.		lbs.
Platinum	0.78	Nickel	0.31
Gold	0·69	Wrot. Iron	0·28
Mercury	0·49	Steel	0·28
Lead	0·41	Cast Iron	0·27
Silver	0·36	Tin	0·26
Bismuth	0·35	Zinc	0·26
Copper	0·32	Antimony	0·24
Brass	0·31	Aluminium	0·094

RELATIVE WEIGHT OF WOODEN PATTERNS AND METAL CASTINGS.

One pound Weight of Pattern in	Corresponding Weight of Casting in pounds.				
	Cast Iron.	Zinc.	Copper.	Yellow Brass.	Gun Metal.
Mahogany	8	8	10	9·8	10
White Pine	14	14·5	18	17·5	17·8
Yellow Pine ...	13	12·6	16	15·5	16
Cedar	11·5	11·4	14·5	14	14·5
Maple	10	9·8	12·5	12	12·4

SOLDERS.

For **lead**	1 part tin, 2 parts lead.
For **brass**	2 parts brass, 1 part zinc.
Hard solder	2 parts copper, 1 part zinc.
Soft solder	2 parts tin, 1 part lead.

FLUXES FOR SOLDERING.

Tinned Iron	Resin or spirits of salts.
Copper and **Brass**	Sal ammonia or spirits of salts.
Zinc	Spirits of salts, **Lead**, Resin.

MUNTZ METAL SHEETS.

Weight per super foot.
60% Copper. 40% zinc.

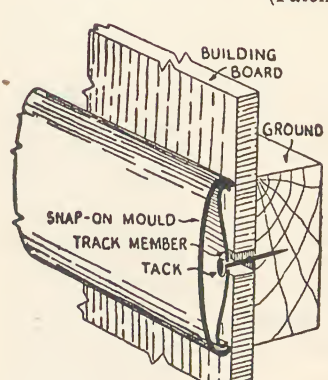
Used for covering timber piles, roof covering, guttering and down-pipes, tanks, &c.

S.W.G.	Weight per ft. s.	S.W.G.	Weight per ft. s.
32	8oz.	19	2lbs.
30	9oz.	18	2¼lbs.
28	10oz.	17	2½lbs.
27	12oz.	16	3lbs.
26	13oz.	15	3¼lbs.
25	14oz.	14	3½lbs.
24	16oz.	13	4¼lbs.
23	18oz.	12	5lbs.
22	1¼lbs.	11	5½lbs.
21	1½lbs.	10	6lbs.
20	1¾lbs.	9	6½lbs.

One quarter of an inch thick and over is termed **Plate.**

SNAP-ON MOULDINGS.

(Patented Design).



Add 27 per cent. Surcharge.

Snap-on Mouldings find ready use for covering joints in sheet materials such as plywoods, veneers, fibre boards and other building sheets, also as Architraves, beadings, etc., for they eliminate exposed fixings such as screws and nails. The track member (of parkerized steel) is tacked in position and the mould (of parkerized steel, stainless steel, aluminium, or brass) is "snapped" over this member. (Parkerizing is a rust proofing process for steel and forms an ideal base for painting).

Size	Parkerized Steel Steel Snap-on-Mould per lin. ft.	Alumium or Brass Unpolished Snap-on-Mould per lin. ft.	Stainless Steel Polished Snap-on-Mould per lin. ft.
¾″ wide ...	-/3	-/4½	1/-
1¼″ ,, ...	-/3½	-/5½	1/3

All Prices include Parkerised Steel Track Member, available in stock lengths of 6 ft., 7 ft. and 13 ft.

For current quotes, See Advertisement, Inside Front Cover.

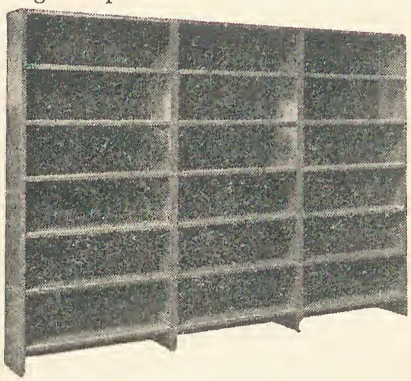
STANDARD PRESSED STEEL PARTITIONS.

Wunderlich Standard Pressed Steel Partitions are ideal for the subdivision of large floor areas in modern buildings. They are simple and dignified in design, fire resisting and permanent, quickly erected, easily dismantled, re-usable, hygienic, businesslike and economical. Industrial Partitions of economical design also available.

For designs and current quotations See Manufacturers' Advertisement, Inside Front Cover.

STEEL SHELVING, LOCKERS, CUPBOARDS AND CABINETS.

Manufactured in Various Types and Standard Sizes to Suit All Storage Purposes. Finished in Olive Green Enamel—Oven Baked.



"STEELBILT" SHELVING.

Typical stack of adjustable shelving. Vertical dividers, Binfronts, doors and drawers can be added if required.

Standardised steel shelving is designed on the knock down principle to meet every storage need, including general storage, textiles, retail stores, engineering, libraries, documentary records, etc. The open skeleton type consists of shelves and posts and is used for general storage of packets, boxes, etc. The solid type with partition sheets is designed for office and industrial purposes. These are available with or without backs. Doors can be added as a lock-up for valuable articles or documents if required.

Shelves are adjustable up or down on 2″ centres. Each shelf is designed to carry approximately 300 lbs. each without permanent deflection. They can be reinforced with optional angles to give each shelf a carrying capacity of up to 1,000 lbs., if necessary.

STANDARD SIZES.

Heights	Width of Bays	Depths	Approximate Prices Per 36″ Bay.
6′–11″		12″, 15″	£7—6′–11″ high, 12″ deep.
7′–11″	36″	18″, 24″	£8—7′–11″ high, 12″ deep.
9′–11″			£10—9′–11″ high, 12″ deep.

"STEELBILT" LIBRARY SHELVING—ANY LENGTHS.

Height	Width of Bay	Depth	Approximate Price Per 34½″ Bay.
7 feet.	34½″	8″ or 10″	£12—7′ high, free standing.

A free technical service is at your disposal. For information, advice and estimates—

See Advertisement, Page 68.

STANDARDISED " STEELBILT " STEEL LOCKERS.

Manufactured in two types—Single tier and five tier.

The construction of steel lockers is on the knock down principle. All component parts are standardised and interchangeable, so that alterations and additions can be easily carried out.

The Single Tier.—This type is suitable for factory and office amenity blocks, Clubs and for other storage uses.

The Five Tier Locker.—This is suitable for industrial purposes where safe keeping of personal effects is important. All doors are fitted with six lever locks with duplicate keys, covered by a master key series.

Single Tier.—Height 5′–11″; Width, 12″; Depth, 18″.—Approximate Price, £4 5s. 0d. each.

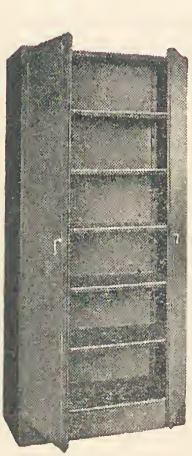
Five Tier.—Height 5′–11″; Width, 15″; Depth, 18″.—Approximate Price, £8 10s. 0d. each.

Five Solid Louvred Doors.

See Advertisement, Page 68.



Single Tier Locker.
Solid Sides and Back, Louvred Door.



STANDARD " STEELBILT " CUPBOARDS.

Steel Cupboards are standardised in two sizes, with shelves adjustable on 3″ centres.

Doors are fitted with a three way locking device and six lever lock with duplicate flat keys. All locks are different and covered by a master key series.

Heights	Widths	Depths	Approximate Prices.
6′–6″	36″	15″ and 18″	15″—£16 5s. 0d.; 18″—£16 15s. 0d.
3′–6″	30″	15″ and 18″	15″—£10 0s. 0d.; 18″—£10 0s. 0d.

For further information and quotes See Advertisement, Page 68.

ALUMINIUM.

The basic products of aluminium and its alloys are many and are not all described here. The Australian Aluminium Co. Pty, Ltd., through their Sales Engineering Service, will give advice and information on all phases of the application and manipulation of aluminium.

See Advertisement, Page 26.

ALUMINIUM ALLOYS.

Aluminium Alloys comprise two main groups—wrought alloys and casting alloys. In Wrought Alloys, the cast metal is mechanically worked by rolling, drawing and forging, while in Casting Alloys, the metal is cast in its final form.

WROUGHT ALLOYS.

Wrought Alloys are divided into two classes : " Non heat treatable" and " heat treatable " alloys. Both classes are supplied in five tempers, but each alloy is not always supplied in all tempers.

The alloy numbers are designed to indicate roughly the main alloying constituents and the percentage. The main groups are as follows :—

Silicon AA 100 to AA 199 ; Copper AA 200 to AA 299 ; Magnesium AA 300 to AA 399 ; Zinc AA 400 to AA 499 ; Manganese AA 500 to AA 599 ; Nickel AA 600 to AA 699.

The first figure gives the group (e.g., No. 3 is the Magnesium Group) and the second figure doubled gives the percentage. Example : AA 320 would be an Aluminium-Magnesium alloy containing 4 per cent. magnesium.

DESCRIPTION AND PROPERTIES OF WROUGHT ALLOYS.

Wrought Alloys (designated by symbol " S "). Commercially pure aluminium (alloy number AA 2S) is used where strength is adequate.

Special grade aluminium (AA 1S). High conductivity, it is used in chemical and electrical industries.

Aluminium Manganese (AA 3S). Increases strength moderately, slight decrease in ductility.

Aluminium-Magnesium-Chromium (AA 57S). Superior resistance to corrosion and sea water.

Aluminium-Copper-Magnesium-Manganese (AA 17S. AA 21S, AA 23S, AA 24S AA 26S). This group is of major importance in structural applications, where maximum in tensile strength is desired.

Aluminium-Magnesium-Silicon (AA 51S, 65S, 50S). Magnesium Silicide is a hardening constituent. Has a superior resistance to corrosion.

Al-Mg-Zn (75S). Still in developmental stage—high mechanical properties.

Other alloys (AA 33S) a 5 per cent. Silicon alloy used for welding rod. AA X1001 is specially developed for free machining on high speed automatic lathes.

CASTING ALLOYS.

Casting alloys are used for castings because of higher mechanical properties and superior casting qualities. Pure aluminium is used only in electrical work where high conductivity is desired.

Commercial castings may be produced as sand castings, permanent mould castings or pressure die castings.

Aluminium Silicon (AA 123, AA 135, AA 160). Noted for their excellent foundry characteristics, permitting all types of casting processes for their high resistance to corrosion and their leak-proof qualities. They are largely used in marine applications.

Aluminium Copper (AA 224, AA 225, AA 226). The presence of substantial amounts of copper makes them susceptible to heat treatment. High strength and good machining qualities are the outstanding advantages.

Aluminium Magnesium (AA 320, AA 350). This group combines resistance to salt water attack, high strength and high ductility. Those containing high percentages of magnesium may be heat treated.

Weights, sizes and prices of flat sheet, rod and bar, coiled wire, tubing and structural aluminium alloy sections (equal and unequal angles, channels, beams and Tee bars) may be obtained on application to manufacturers.

SOFT SOLDERING AUSTRALUCO ALUMINIUM.

Soldering generally implies the joining of two metallic components using a molten metal cement. This cement must wet the complete area of both mating surfaces and must alloy, at least superficially, with the parent metal.

To obtain complete alloying over the entire surface requires that the metallic surface shall be free from all dirt and oxide. In the case of the heavy metals, it is quite easy to obtain this condition either by mechanical or chemical cleaning. Aluminium, however, is coated with a tenacious film of oxide which reforms immediately the cleaned surface comes into contact with the air and which is difficult to remove by chemical means at soft soldering temperatures. Failure to realize this difference between aluminium and the commonly soldered heavy metals has led to the application of standard soldering technique to aluminium, resulting in failure of the joint and the common fallacy that aluminium cannot be soldered.

By using the correct materials and technique it is possible to produce a serviceable and efficient junction. It must be remembered, however, that the act of soldering creates a bi-metallic junction which, under severely corrosive conditions, such as intermittent immersion in sea water, may lead to rapid attack and failure of the joint. Where such conditions occur, especially in the presence of an aqueous chloride solution, the junction should be made by either brazing or welding. This applies particularly to the alloys of aluminium.

To obtain a satisfactory joint in Australuco aluminium it is necessary to remove the oxide film and allow the solder to " tin " the surface before it can come into contact with the air again.

This is achieved by firstly cleaning the surface as efficiently as possible by either mechanical or chemical means. The oxide film on Australuco aluminium and its alloys is best removed by scrubbing with either steel wool or a steel brush. Chemical cleaning should only be considered for mass production jobs and is carried out in the case of AA 2S (Commercially pure Australuco aluminium) by dipping the part to be soldered in a hot 10 per cent. solution of caustic soda, and in the case of all other alloys by dipping in the caustic soda solution followed by a dip in 10 per cent. nitric acid which removes the dark film left by the caustic soda.

Having cleaned the surface by one of the above methods, it is now necessary to bring the surface in contact with the molten solder and at the same time to remove what remains of the oxide film so that the solder may alloy with the parent metal. Where the area is large and easy to get at, this may be well carried out by running the solder on to the surface and then scrubbing it with a steel wire brush. If the area to be soldered is small or in an inaccessible position, the tinning should be carried out using a special solder which contains both a tinning alloy and a hard abrasive constituent which removes the film when the solder is rubbed on the aluminium, either in the form of a stick or on an orthodox soldering iron. The composition of one such solder is as follows :—Tin, 45 per cent. ; Zinc, 49·5 per cent. ; Antimony, 5·5 per cent.

When the surface has been tinned by either of the above methods, the excess solder should be wiped off with a clean rag.

Suitable solders for use with the wire brush technique of tinning and for making the actual joint when the surfaces have been tinned using the special solder stick are given below :—

No. 1 :	Tin	90%	Melting point 200°C.
	Zinc	10%	
No. 2 :	Cadmium	82%	Melting point 270°C.
	Zinc	18%	

Both these solders correspond to the eutectic point of the alloys and hence will run very readily as they have a melting point instead of a melting range. If, however, for a special application it is necessary to have a solder which becomes " pasty " during solidification this can be achieved by increasing the zinc content in both cases. The composition of one such solder is as follows :—

No. 1a :	Tin	80%	Melting Range 200°C—220°C.
	Zinc	20%	
No. 2b :	Cadmium	70%	Melting Range 270°C—290°C.
	Zinc	30%	

As stated above, the oxide film occurring on aluminium is most difficult to remove by chemical means at soft soldering temperatures, and any flux which would remove this film would be of such a highly corrosive nature that its use cannot be recommended except under very special circumstances. Very satisfactory results will be obtained without the use of a flux, providing that a reasonable amount of care is taken to remove the film by the mechanical methods described above. Soldered joints in AA 2S would be suitable for joints in piping systems used for circulating tap water, oil, petrol, commercial refrigerants and beer, while they would be suitable in AA2S and all other Australuco aluminium alloys for such use as electrical connections and handrails for transport equipment.

Tests carried out on a lap joint in commercially pure aluminium, using No. 1 solder, indicate that a minimum strength of 5,600 lb. to the square inch can be expected, while a butt joint in direct tension will give a minimum strength of 3,300 lb. to the square inch. The electrical conductivity of butt and single lap joints is for all practical purposes the same as that of a solid conductor.

For further information and advice see Advertisment, Page 26.

LABOUR CONSTANTS

EXCAVATION CONSTANTS.

	Unit.	Hours.
To areas in Average soil to 2′–0″ deep by hand	Per Cu. Yard	1·9
To areas in Clay to 2′–0″ deep by hand ...	,, ,, ,,	3·0
To areas in Shale to 2′–0″ deep by hand ...	,, ,, ,,	4·5
Add for wheeling and spreading on site ...	,, ,, ,,	·8
In trenches Average soil to 3′–0″ (Average depth)	,, ,, ,,	2·3
In trenches Stiff soil to 3′–0″ (average depth)	,, ,, ,,	2·3
In trenches Clay to 3′–0″ (average depth) ...	,, ,, ,,	3·4
In trenches Shale to 3′–0″ (average depth)	,, ,, ,,	5·5
Add for backfilling	,, ,, ,,	·66
To pier holes in Average soil to 2′–0″ deep...	,, ,, ,,	3·1

DRAINER CONSTANTS.

	Unit.	Hours.
Stormwater drain pipes, G.E., 4″ dia. laying and jointing only	Lin. Feet	·10
Sewer drainpipes 4″ dia. laying and jointing only	,, ,,	·125
Sewer drainpipes 6″ dia. laying and jointing only	,, ,,	·16
Sewer drainpipes C.I. 4″ dia. laying and jointing only	,, ,,	·125
Add extra over for fittings at double time for ordinary pipes.		
Add for excavation necessary.		

PLUMBER.

	Unit.	Hours.
Eaves gutter, 4″ quadrant gal. iron including gutter brackets ...	Per 100 Lin. Feet	15·0
Add for mitres	Each	·2
Add for downpipe outlets ...	,,	·1
Downpipes—3″ dia. gal. iron including astrigals	Per 100 Lin. Feet	12·0
Add for offsets	Each	·3
Valleys in gal. iron up to 18″ wide ...	Per 100 Lin. Feet	15·0
Stripping gal. iron corrugated roofing ...	Per square	2·0
Stripping Terra Cotta Roofing tiles ...	Per square	3·0
Water service from main to meter ... (Add for excavation at rates before)	Per 100 Lin. Feet	20·0
Add for fittings	Each	·25
Water meter taking delivery and fixing ...	Each	4·0
Water piping Gal. ¾″ dia. from meter to branches, including shallow excavation	Per 100 Lin. Feet	15·0
Add for fittings	Each	·25

SANITARY PLUMBER.

	Unit.	Hours.
Bath—taking delivery and setting in position	Each	3·00
Basin—Wall ditto including brackets ...	,,	2·00
Sink—(set in terrazzo drainer) Connect only	,,	1·00
Tubs—two compartment set on pedestals and connect to service	,,	1·00
Pan—washdown, complete with cistern and flush pipe	,,	4·00
Suite—Low down complete and connected to service	,,	6·00
Urinal—3 stall and cistern, assemble and all connections to service and vents necessary ... ... —	Item.	48·00

GASFITTER.

	Unit.	Hours.
Gas Meter—taking delivery and fixing ...	Each	4·5
Gas stove—take delivery and connect to service	,,	4·0
Gas Copper—as above and including flue pipe and cowl	,,	4·0
Gas bath heater as above	,,	5·0
Gas Fire as above	,,	3·0
Gal. piping 1¼″ dia. from main to meter ...	100 Lin. Feet	24·0
Gal. piping 1″ dia. from meter to branches	100 Lin. Feet	18·0

BRICKLAYER.

		Unit		Hours
Solid brickwork to foundations in cement mortar	Bricklayer	Per	Rod	50·66
	Labourer	,,	,,	20·25
11″ cavity walls, from top of footings to underside of bearers in cement mortar.	Bricklayer	,,	,,	76·0
	Labourer	,,	,,	30·4
11″ cavity walls from Ground Floor to 1st Floor level in compo mortar.	Bricklayer	,,	,,	60·8
	Labourer	,,	,,	24·3
4½″ thick partition walls from Ground to first floor level in compo mortar.	Bricklayer	,,	,,	67·55
	Labourer	,,	,,	27·02
11″ cavity walls from 1st floor to second floor level, in compo mortar.	Bricklayer	,,	,,	67·55
	Labourer	,,	,,	33·75
	Hoist Driver	,,	,,	11·25
Solid brickwork to 9″ x 9″ sleeper piers and footings in cement mortar.	Bricklayer	,,	,,	76·0
	Labourer	,,	,,	30·4
Pointing Joints to face bricks ...	Bricklayer	Per Sup. Yd.		·25
Snapped header sills	Bricklayer	Per Lin. Ft.		·2
Cleaning down brickwork to first floor level		Per Sup. Yd.		·2

CARPENTER.

	Unit.	Hours.
Floor framing 4″ x 3″ bearers, 4″ x 2″ joists in Hardwood at ground floor level ...	Per 100 Sup. Feet.	3·50
Creosoting floor timbers	Per 100 Sup. Yds.	9·00
Flooring 4″ x 1″ T. & G. Hardwood ...	Per Square	4·00
Flooring 4″ x 1″ T. & G. Pine	Per Square	3·5
Wall framing 4″ x 2″ plates, studs, 4″ x 1½″ nogging, 3″ x 1″ braces in Hardwood	Per 100 Sup. Feet.	5·00
Wall framing 4″ x 2″ plates, studs, 4″ x 1½″ nogging, 3″ x 1″ braces in Oregon ...	„ „ „ „	4·20
Wall framing 3″ x 2″ plates, studs, 3″ x 1½″ nogging, 3″ x ¾″ braces in Hardwood	„ „ „ „	6·00
Wall framing 3″ x 2″ plates, studs, 3″ x 1½″ nogging, 3″ x ¾″ braces in Oregon ...	„ „ „ „	5·25
Roof framing 4″ x 2″ Rafters, 4″ x 3″ Purlins 7″ x 1¼″ Ridge and hips in Hardwood	„ „ „ „	6·00
Roof framing 4″ x 2″ rafters, 4″ x 3″ Purlins 7″ x 1½″ Ridge and hips in Oregon	„ „ „ „	5·00
Ceiling joists 4″ x 2″, hanging beam 7″ x 1½″ with dogs, etc., in Hardwood	„ „ „ „	5·25
Ceiling joists 4″ x 2″, hanging beam 7″ x 1½″ with dogs, etc., in Oregon ...	„ „ „ „	4·00
Fascia Oregon fixed to foot of rafters ...	Per 100 Lin. Feet.	6·00
Asbestos cement, internal and external walls	Per Super Yard.	·25
Asbestos cement, ceilings	Per Super Yard.	·375
Battens 2″ x 1″ nailed up for ceilings above	Per 100 Super Ft.	6·00
Fencing complete 6 ft. paling 5″ x 2″ posts morticed with 3″ x 2″ rails and palings	Per Lineal Foot	·2
Fencing complete 5 ft. paling 5″ x 2″ posts morticed with 3″ x 2″ rails and palings	„ „ „	·18
Park rail fence 4″ x 4″ posts 3″ x 2″ top rail	„ „ „	·33
Front fence 4″ x 4″ post, two 4″ x 2″ rails and chain wire infil	„ „ „	·44
Fix palings only 5 or 6 ft. (to rails) ...	„ „ „	·13
Hand morticing 5″ x 2″ H.W. posts ...	Per Post.	·25
Digging post holes only	Per Hole.	·08
Pulling down old paling fence ...	Per Lineal Foot.	·10

JOINER.

	Unit.	Hours.
Doorframes 4″ x 3″ Solid rebated frame 6′–10″ x 2′–10″, make and fix ...	Each	4·5
Jamb linings 6″ x 1½″ Solid rebated for 6′–8″ x 2′–8″ doors frame and fix ...	Each	3·0
Storm Moulds 1″ x 1″ fixed to frames ...	Per 100 Lin. Feet	1·5

JOINER Contd.

	Unit.	Hours.
Doors, External, 6′–10″ x 2′–10″ x 1¾″ framed, ledged, braced and sheeted, Shopwork	Each	4·0
Add for fixing on job	,,	1·75
Add for fixing furniture	,,	1·00
Box frame windows, Standard Frames, 4′–6″ high, 3′–1″ wide. Shopwork ...	,,	3·5
Add fixing on job	,,	·75
Window sashes—Standard for above ...	Per Pair	2·0
Window sashes—Add for fixing on job ...	,,	1·5
Architraves, 3″ x 1″ or 4″ x 1″	Per 100 Lin. Feet	5·0
Skirting, 3″ x 1″ or 4″ x 1″	,, ,, ,, ,,	6·0
Picture rail, 2″ x 1″	,, ,, ,, ,,	4·5
Quadrant, ¾″ or 1″ to floors	,, ,, ,, ,,	2·75
Shelving 1″ thick 12″ wide (small lengths)	,, ,, ,, ,,	16·00
Ladder Rails, 2″ x 2″, for shelving ...	,, ,, ,, ,,	8·00

PAINTER.

	Unit.	Hours.
Two coat cement base paint to new fibro walls—external	100 Sup. Yds.	16·00
Two coat cement base paint to new fibro walls—internal	,, ,, ,,	14·00
Three coat oil paint to woodwork—external	,, ,, ,,	36·00
Three coat oil paint to woodwork—internal	,, ,, ,,	32·00
Two coats Kalsomine on Asbestos or fibrous plaster walls—internal ...	,, ,, ,,	12·00
Two coats Kalsomine on Asbestos or fibrous plaster ceilings—internal ...	,, ,, ,,	14·00
Add for coat of sealer if required ...	,, ,, ,,	4·00
One coat stain, two coats varnish to woodwork—internal	,, ,, ,,	24·00
One coat stain, two coats varnish to narrow widths of doors, frames, sashes, etc.—internal	,, ,, ,,	36·00

WALL AND FLOOR TILER.

	Unit.	Hours.
6″ x 6″ glazed wall tiles	Per Super Yard.	2·0
4″ x 4″ ,, ,, ,, ...	,, ,, ,,	2·50
Recesso fittings 6″ x 6″	Each	·50
,, ,, 6″ x 3″	,,	·33
Floor tiles 2″ x 1″	Per Super Yard.	1·75
,, ,, 2″ x 2″	,,	2·0
,, ,, Mosaic	,,	2·25

CONCRETOR CONSTANTS.

	Unit	Hours.
Footings with 2 h.p. mixer, 6 men operating, wheeling, depositing and ramming ...	Cubic Yard	3·00
Suspended Floors with 4 h.p. mixer, 9 men operating, wheeling, depositing and ramming	,, ,,	3·33
Premixed concrete for footings allow handling placing, etc.	,, ,,	2·00
Paving with 2 h.p. mixer, 5 men operating, wheeling, placing, screeding	,, ,,	5·00
Add for render finishing	Super Yard	·5
Filling to ground floors	Cubic Yard	2·00

Reinforcement.

	Unit	Hours.
Mild steel rods in $\frac{3}{8}$″ and $\frac{1}{2}$″ dia. to footings ...	Per cwt.	1·5
,, ,, ,, ,, $\frac{3}{8}$″ dia. to suspended floors	,, ,,	2·00
,, ,, ,, ,, $\frac{1}{2}$″ and 1″ dia. to columns	,, ,,	1·75
,, ,, ,, ,, $\frac{1}{4}$″ and $\frac{3}{8}$″ dia. stirrups ...	,, ,,	2·5

PLASTERER.

	Unit.	Hours.
One coat cement render $\frac{1}{2}$″ thick to internal walls 4 : 1 mix Plasterer per	100 Sup. Yd.	17·5
Labourer ,,	,, ,, ,,	7·0
One coat cement render $\frac{1}{2}$″ thick to external walls 4 : 1 mix Plasterer per	,, ,, ,,	20·0
Labourer ,,	,, ,, ,,	8·0
Two coat cement render $\frac{3}{4}$″ thick to external walls 4 : 1 mix Plasterer per	,, ,, ,,	35·0
Labourer ,,	,, ,, ,,	14·0
One coat Keenes cement steel trowelled to hand finish average $\frac{1}{8}$″ thick Plasterer per	,, ,, ,,	25·0
Extra labour for running vee joints at dado heights ... ... Plasterer per	100 Lin. Feet	10·0
Extra labour for forming $\frac{1}{2}$″ radius angles to doors and windows Plasterer per	100 Lin. Feet	12·5

Add for scaffold on external or internal work.

PRECISION BRICKS.

Precision Brick Pty Ltd. has brought to this country the most modern and efficient method of manufacturing bricks, developed in America, Europe and the United Kingdom.

The Company, at its North Cronulla plant, is using the world's fastest and strongest brick press—the Jackson and Church Press.

This press, which weighs 28,000 lbs., produces 3,600 bricks per hour, exerting 5 tons pressure to each square inch of brick. This tremendous pressure drives together the various particles of the bricks' constituents into a dense mass. Consequently Precision bricks are stronger than bricks made by ordinary methods. They excel in compression and transverse (rupture) ratio strengths several times over in comparison

(*Continued at foot of next page.*)

PROPORTIONS OF TRADES

AVERAGE PERCENTAGE COST OF TRADES IN VARIOUS TYPES OF BUILDINGS.

Trade	Large Buildings.	Domestic Brick	Domestic Timber
Excavator	3·5	2·0	1·0
Drainer	3·0	3·5	3·0
Concretor	14·5	5·0	4·0
Formwork	6·0	0·5	0·5
Pavior (Cement)	2·5	1·5	1·5
Tiler Wall	1·0	2·5	2·5
Terrazzo	1·6	·5	—
Bricklayer	9·0	20·5	2·5
Smith and Ironworker ...	0·5	1·5	·5
Structural Steel	12·5	—	—
Carpenter	4·05	9·0	23·0
Joiner	13·0	18·0	23·0
Roofer	1·0	6·0	7·0
Plumber	5·2	6·5	7·5
Electrician	6·15	2·5	2·5
Plasterer	3·5	4·5	1·1
Fibrous Plaster ...	3·0	3·0	6·0
Glazier	1·5	0·5	0·5
Painter	4·5	5·0	7·0
Generally	1·0	6·0	5·5
Insurance	3·0	1·5	1·4
	100·0	100·0	100·0

PRECISION BRICKS—*continued.*

with ordinary bricks and their water absorptions are ideally low.

Precision bricks are mensurally accurate to $\frac{1}{32}$nd of an inch in conformity with the Australian Standards Association specifications. Their arrises are sharp and clean. This uniformity means that they can be laid faster than ordinary bricks, which, because of the manner of production, must inevitably vary considerably in size.

The quality of Precision bricks is uniform. Therefore there is no wastage whatsoever in their use. There are no clinkers or callows. Architects, builders, and quantity surveyors can make accurate calculations as to quantities required for any job.

Precision bricks are free from warp and true to size. Their corners are square and their faces are smooth and free from blemishes. They can be broken cleanly and with a minimum of effort. The bricks do not require individual inspection and cleaning.

The great strengths of Precision bricks enables them to be used in column and pier work in place of steel.

They are manufactured in a number of attractive colours and shades. Architects' and builders' special colour requirements can be catered for to a degree never previously thought possible.

See Advertisement, Page 81.

PROPORTIONS OF LABOUR

APPROXIMATE PROPORTION OF LABOUR FOR VARIOUS BUILDING OPERATIONS.

Materials and Labour = 100 per cent.

Trade	Percentage of Labour	Trade.	Percentage of Labour
Setting out	100·0	Joiner—Generally ...	40
Excavation	90·0	Doors ...	39
Drainer—Stormwater	65·0	Windows ...	41
Sullage ...	72·0	Louvres ...	30
Sewer ...	75·1		
		Roofer—Generally ...	20·0
Concretor—Floors ...	35	Terra Cotta Tiles	22·1
Paths ...	60	Cement tiles ...	28·0
Formwork	60	Galvd. Iron ...	21·2
Reinforcement ...	40	Asbestos, Standard	25·0
Pavior Cement ...	70	Asbestos, Deep	22·3
Tiler Wall—Cream ...	35·6		
Coloured	25·4	Plumber—Generally	50
Floor ...	27·0	Main ...	52
Bricklayer	55	Water ...	60
		Roof Plumbing	70
Smith & Ironworker ...	30	Electrician—Generally	40
Structural Steel ...	15	Light ...	38
Carpenter—Generally	40	Power ...	42
Floor Framing	30	Plasterer	70
Wall ,,	43·5	Fibrous plaster Walls	30·0
Roof ,,	41·0	Ceilings	45·0
Floors	35·0	Glazier	50
Asbestos Cement Walls	50	Painter—Generally ...	65
Ceilings	75	Walls, Ext.	58
Fencer Paling ...	34·5	,, Int.	60
Front ...	65·0	Roof ...	70
Park Rail ...	55·3		

LIFTS AND ESCALATORS

Lift Installations are almost invariably entrusted to specialists. Extensive and up-to-date experience with the requirements of Government and other authorities is essential. The information given here is intended only as a guide to builders who may be consulted about lifts or who may wish to know approximately what provision should be made for them in buildings ; but it is advisable to check it up with specialists before any definite action is taken.

The lift contractor supplies and fixes the machinery and its controlling apparatus, the car frame and safety gear, the balance weight, guides and backings for car and balance weight, the ropes, door locks, buffers, limit-switches and other devices appertaining specially to lifts. He usually provides and fixes also the rolled steel joists that support the machinery, the car floor and car superstructure, and the door hangers and tracks. Unless the builder has the special experience necessary to make the doors it is better for the lift contractor to deal also with these, and in Automatic lifts it is almost essential. Although the enclosures to the liftwell are generally formed by the builder, they are part of the lift as far as the Government Lift Inspector is concerned, and care should be taken that drawings of them have been submitted and approved before they are put in hand. The builder trims the well, forms the water-proof pit, builds the motor room and provides the access to pit and motor room required by regulations.

Regulations become stricter every year. It is important that liftwells should be built accurately to the dimensions of the " layout " finally decided upon. Any inward projections may result in the car fouling the well ; and special care should be applied by the builder in locating the well trimmers.

Electric power is usually brought to the lift motor room by the contractor for the general electrical installation, and as it will be needed there some weeks before the lift is required for service, this should be specifically provided for in his contract.

There should be a clear understanding in advance with the lift contractor about the use of cranes for placing machinery in position, and about the date when liftwell and motor room are to be finished and handed over for his exclusive use (generally upwards of twelve weeks before the lift is required for service). Arrangements to use the lift as a builder's hoist are seldom satisfactory, as the lift contractor and builder both need it most at about the same time. Moreover, lift cars are often damaged by conveying building materials, and there have been a regrettable number of fatal accidents to builder's employees arising out of this use of lifts during progress. Other accidents prove that lift wells should not be used for running pipes or for similar purposes.

The fact that every lift is required to be regularly inspected and maintained throughout its life makes it advisable to deal only with well-established lift concerns. It is possible to make a lift out of cheap ordinary motors, switches, and other parts not intended for lifts ; but such a combination is liable to prove unsatisfactory.

APPROXIMATE COSTS.

The approximate prices of lift work outlined in this book, being compiled from various independent sources, do not represent the prices of any " lift installation " firm, and are only inserted as a guide for a rough preliminary estimate.

For exact quotes and technical advice required by architects and contractors, firms specializing in this class of work must be consulted.

See advertisement, page 9

At the time of going to press there is an upward trend in prices. Figures here indicated are for Australian Capital Cities and are based on the rate payable to an Electrical Fitter being 4/9d. per hour.

For preliminary estimates the prices may be taken to vary roughly in the proportion that the prevailing hourly rate of an Electrical Fitter bears to that quoted above ; where more accurate figures are required a reliable Lift Contractor's advice should be sought.

Unless otherwise indicated the figures include for the supply and installation of the lift machinery, control apparatus, counter-weight, car, car superstructure, runners, safety gear, bells (where required) and the door locks. They do not include for the building of the lift well, pit, enclosure, fronts, doors, motor room and approaches thereto, nor do they include the cost of providing the electric supply to the motor room. The present trend is to build lift wells entirely of brick or concrete and in fact the controlling authorities in most cases insist on this construction. Brick walls supporting car and counter-weight guides should be not less than 9 inch set in cement.

Costs rise sharply at certain small changes in running speeds. For example : a lift running at 200 feet per minute, may use round steel runners on wooden backings, with gripper-type safety gear ; while one at 210 feet per minute requires planed tee-section steel runners and suitable safety gear.

CLASSES OF LIFTS.

Handpower Lifts.—These may be made to handle practically any load, but handpower for heavy loads necessitates such slow speeds that their use in Australia is confined almost exclusively to service lifts, where the initial outlay is the main consideration. They are also commonly used abroad for transporting invalids in private houses and hospitals.

The machinery is usually placed over the top of the well ; an endless rope is looped down either outside or inside the well, and the operator shifts the loads by pulling on this rope. Gearing is included whereby a moderate pull suffices to move the car at a speed that varies inversely with the load. A brake is provided so that the load may be stopped whenever desired.

A Handpower Service Lift travelling about 12 feet from one floor to another, and carrying up to 56lb. with a car 2 feet cube, costs about £180 installed. The well is required to be about 6 inches larger than the car all round.

Lift specialists are usually willing to advise whether a handpower lift is practicable for any other special conditions. The nett load to be carried, travel, car dimensions desired, space available for a pit and above the top landing should be stated in enquiries, also some idea who is to work the lift (average man, boy, girl, etc.).

Hydraulic Lifts.—Although the electric lift is generally favoured for most situations the hydraulic is by no means obsolete. For comparatively short travel where water at 60lbs. pressure or upwards is freely available it is still a system to be considered but the Water Authorities will seldom allow connection to public water mains.

Belt-driven lifts employing flat leather belts are now rarely installed although they are sometimes used for goods lifts up to say one ton capacity where initial cost is a primary consideration.

Electric Service Lifts or "Dumbwaiters."—These can be made suitable for any public electricity supply, or private supply of 10 kilowatt capacity or over.

Regulations limit the cars to not more than 9 square feet in floor area by 4 feet high, but it is wise to keep to the minimum that will hold the largest articles normally carried, because experience shows that people will fill the cage full, even if this means an overload which may damage the apparatus. A sensible size car for service to the different floors of residential flat buildings or for hotels, is 2ft. x 2ft. x 2ft. 6in. high, rated to carry a load of 100lbs. This will require a lift well approximately 2ft. 10in. wide x 2ft. 6in. deep.

Such lifts may be controlled automatically by push buttons from one landing only, or by "Call and Send" control whereby they may be sent or called from any landing to any other landing; and on arrival at the desired landing they stop automatically. In residential flats it is usual to provide some means of communication such as a telephone between the landing to which tradesmen have access and each individual flat. The cost of such a lift serving two floors is about £575 upwards, and each additional floor costs about £50. This does not include speaking tubes or telephones or doors.

The simplest and best "layout" is where there is one opening to the car only so that goods are taken out the same way as they go in; sometimes however cars are arranged with "through" entrances.

Electric Goods Lifts.—Vary from Service Lift duties up to any load and speed (the load and speed of a lift are generally referred to as its "duty"). A minimum size car for a warehouse lift is about 5ft. x 5ft., to lift a load of 15 cwt. The ordinary warehouse lift usually carries a ton at 125ft. to 200ft per minute. The former duty, serving four floors, with control by car switch, will cost about £2,200 and each additional floor £100. The lift should be made two-speed for over 150 feet per minute (about £350 extra). Generally speaking the handling qualities of a goods lift are greatly improved if it is arranged to stop automatically dead level with the landings and the cost is about £200 extra.

Car switch control is usual, as a goods lift does not need a certificated driver. The advantages of automatic control for this service are small unless the lift is very seldom used, or unless for some other reason it is uneconomical to employ a driver. Automatic control adds about £200 plus £30 per floor to the cost of a car switch controlled Goods Lift.

There should preferably be only one entrance to goods lift cars. Regulations require that the cars of all automatic lifts (goods or passenger) shall be fitted with gates of some kind at each car entrance and no really satisfactory gate for a goods car has yet been produced.

Most situations require goods lift doors to be fire resisting type and these are usually of the Peelle, vertical sliding or hinged type.

There are Garage Lifts working in Australia to carry loads up to 6 tons, with cars 35 feet long x 9 feet wide.

Electric Passenger Lifts.—Each passenger is reckoned at 150lbs weight and to occupy 2 square feet of car floor area. Speed is seldom lower than 120 feet per minute, and the highest speed in Australian practice is 600 feet per minute, although it is doubtful if there is much to be gained by exceeding 450. High speed lifts are usually of the " gearless " type with " variable-voltage " control and their features can hardly be dealt with in these brief notes.

The duties of ordinary " geared " lifts range from 900 pounds at 125 feet per minute to 3,000 pounds at 350. Single speed lifts are often employed up to 150 feet per minute, from 150 F.P.M. to 300 F.P.M. ; 2 speed control is desirable (if not mandatory) under local regulations ; beyond 300 F.P.M. some form of " variable " speed control is usually called for. Regulations usually demand that a passenger lift must be operated by a certificated driver, unless it is provided with automatic control. A driver will be found essential to regulate the traffic in busy lifts.

Passenger lifts may vary in cost from £2,600. A 5 floor lift for residential flat purposes, to carry 6 people at 120 feet per minute with a car size of 3ft. 2in. x 4ft. 2in. and having automatic control, costs about £2,800. One for 8 people at 200 feet per minute for 8 floors costs about £3,700.

A lift for a 10 floor office building to carry 17 passengers at 300 feet per minute should preferably be of the " geared variable voltage " type and would cost from £7,000 to £7,800 according to the form of control. Above 300 feet per minute " gearless variable voltage " lifts are usually desirable. The prices of lifts of this type vary so considerably according to requirements that a general statement on price is impossible.

Car Superstructures for passenger lifts vary in cost from £150 to £250 according to design and material of construction. There should preferably be only one entrance in a car. Regulations require car gates on all entrances of all automatically controlled lifts, and in some other circumstances ; they also discourage the use of glass.

Noiseless operation has become a very important consideration now that buildings are frequently made of concrete and electric supply systems are on the alternating-current system. It is practically impossible to prevent the transmission of noise in a one-piece concrete structure, and care must be taken in such cases to select equipment that gives rise to as little noise as possible. A double-ceiling to the liftwell, and celotex-lined walls in the motor room help to keep noise out of the structure. Brick motor rooms are preferable to concrete for this reason. In some concrete buildings the liftwell has actually

been built as a brick tower within the building, and insulated from it at the landing by cork packing. Automatic door-closers that embody checking buffers are valuable to prevent noise from slamming lift doors.

Enclosures.—Regulations regarding enclosures vary somewhat according to situation but there is a general trend towards totally enclosed brick liftwells with fire resisting metal fronts and doors.

Regulations governing lift installations vary somewhat in different states of the Commonwealth and it is always advisable to seek information regarding local requirements before approaching finality on lift proposals.

For advice, information and quotes, see advertisement, page 9.

ESCALATORS AND ELEVATORS.

The estimating of costs of Escalators and Elevators, being a specialized job and varying according to sizes and capacities, must be left to the manufacturers. The following facts are given for the guidance of architects and engineers in the preparation of specifications.

FACTS ON ESCALATOR AND ELEVATOR SPECIFICATIONS.

Escalator Planning Facts.

Widths	2ft. 0in., 3ft. 0in., and 4ft. 0in. between balustrades.
Heights	From 8ft. 0in. to 90ft. 0in. vertical rise.
Angle	30 degrees.
Capacity	4,000, 6,000 and 8,000 persons per hour.
Speed	90 feet per minute (Standard). 120 to 180 feet per minute (Railway type).
Balustrading	Extruded Aluminium. Extruded Nickel Silver. Plywood.
Treads	Die Cast Aluminium.
Newels	Extended type.

Elevator Planning Facts.

Controls	Push button, Car Switch, Collective, or Signal.
Speeds	50 to 600 feet per minute.
Rise	Up to 1,000 feet.
Safeties	Instantaneous or Gradual Application.
Platform Size	On application.
Guide Rails	Tee steel.
Hoistway Doors	Hollow metal.
Door Operators	Manual or Electric.

Consult your manufacturer in the early stages of your planning. He can help, particularly if your project is of a special nature.

For further information, advice and quotes, see advertisement, page 16.

MASONRY

SANDSTONE
FOOTINGS TO BUILDINGS.

This class of work comprises footings to residences, cottages, garages, etc., and usually consists of rock faced (hammer dressed) random rubble built in 12″ courses, and is estimated in perches of 16½ ft. by 1 foot by 18″ thick or less.

The footings are measured in perches as a face measurement of walls, and although the internal walls to take 4½ brickwork are not the full 18″ thick it makes no difference to the measurement. For this work the stone is usually quarried locally, or even on the building site if stone is present.

Approximate Cost—Per Perch.

Labour, Materials and Pointed complete :—Random Rubble.—Built in Courses and Pointed, £5 10s. 0d. per perch.

The above price includes cartage of one mile from quarry and is for walls to 5 feet in height.

For each additional mile cartage of stone add 3/– per perch.

For walls from 5 to 10 feet high add 5/– per perch on extra height.

Memorandum.

Mortar required, per perch—

Rubble contains about 5 cubic feet of mortar.

Ashlar, about 2 cubic feet.

Solid Masonry, from 1 to 1½ cubic feet.

DIMENSION STONE—HAWKESBURY QUARRIES.

A good hard sandstone, suitable for all classes of buildings, is quarried at " Wondabyne " quarries at Hawkesbury. Dimension stone for foundations, walls, columns, parapets, buttresses, lintels, etc., is estimated at per cubic foot, and varies according to the amount of work involved in preparing the stone and the finish required.

For this reason costs are given for an approximate estimate only, and it is advisable to contact the contractors engaged in this work for an accurate estimate (See Adveritsement Page 71).

The approximate costs are given under the following headings :—

1. Cost of Stone—ex quarry at per cubic foot.
2. Cartage rates—mileage.
3. Facings to stone—at per foot superface.
4. Labour bedding per cubic foot.

EXAMPLES OF COSTS—FOR APPROXIMATE ESTIMATES.

Block Stone—Ex Quarry, 9/– per cubic foot.

Cartage Rates.

One Cu. Foot Sandstone weighs 140 lbs—16 Cu. Ft. weighs 1 Ton.

Sandstone Cartage—First Mile, 8/– per ton.

Each additional mile, 3/– per ton.

Labour Costs—Facings to Sandstone.

Machine Faced—Finished Fine Surface, 3/3 per super foot.
Sawn Faced, 2/3 per super foot.
Beds, 2/3 per super foot.

Labour Bedding in Walls—Not Including Scaffolding.

One Storey to 10 ft. High.—2/3 to 3/3 per cubic foot.
Two Storey—to 20 Ft. High—2/9 to 3/9 per cubic foot.

Example of Approximate Estimate No. 1—Metropolitan Area—Plain Walls only—Per Cubic Foot—Include Openings.

Say 3 ft. x 1 ft. x 18″ thick Dimension Stone.
In wall 12 ft. long by 12 ft. high by 18″ thick = 216 cubic ft.
Machine Faced Outside—Sawn-faced Inside.

	£	s.	d.
216 cu. ft. Sandstone ex quarry at 9/– cu. ft.	96	16	0
144 Super feet Machine Faced externally at 4/3 cu. ft. ...	30	12	0
144 super feet Sawn-faced Internally at 1/– cu. ft.	7	4	0
288 super feet Bed and Perpen. Joints, Sawn Faced at 2/3 cu. ft.	32	8	0
Labour Bedding 216 cu. ft. at 3/– cu. ft.	32	8	0
Loading and Cartage 13½ tons to rail—5 miles at £1 per ton...	13	10	0
Freight by Rail 13½ tons at £1 per ton	13	10	0
Cartage 13½ tons to Building—3 miles at 15/– per ton ...	10	2	0
Mortar and Incidentals	2	0	0
Nett Cost = 22/1 per cu. ft. Nett Cost 216 cu. ft. ...£	238	10	0

Scaffolding not included.

SANDSTONE PRICES—APPROXIMATE BASE PRICE LIST.

Add 15 per cent. Surcharge.

Note.—All prices based on minimum window opening of 3′ 0″. Additional charges for smaller sizes.

1. **Window Sills—plain sunk weathered :—**
   - 15″ x 7″ ... ... 35/– to 37/– per lin. ft.
   - 9″ x 12″ ... ... 30/– to 32/– „ „ „
   - 12″ x 15″ ... ... 45/– to 48/– „ „ „
2. **Window Jambs :—**
   - 6″ x 12″ ... ... 25/– to 27/– per rising ft.
   - 21″ x 9″ ... ... 45/– to 48/– „ „ „
   - 21″ x 6″ chamfered ... ... 40/– to 42/6 „ „ „
   - 21″ x 9″ „ ... ... 47/6 to 50/6 „ „ „
   - 21″ x 9″ Notched ... ... 49/– to 52/– „ „ „
3. **Window Heads :—**
   - 12″ x 6″ plain ... ... 20/6 to 22/– per lin. ft.
   - 6″ x 18″ chamfered ... ... 32/– to 34/– „ „ „
   - 9″ x 18″ „ ... ... 37/6 to 40/– „ „ „
   - 9″ x 18″ plain ... ... 33/6 to 35/6 „ „ „
   - 9″ x 18″ notched ... ... 41/6 to 44/6 „ „ „

APPROXIMATE SANDSTONE PRICES.

Note.—All prices quoted F.O.R. Quarry or Stoneyard.
Add Cartage and Freight Extra. **Add 15 per cent. Surcharge.**

1. Flagging

		per sq. yd.
Single Sawn	2″	12/– to 14/–
	3″	16/– to 17/–
	4″	19/6 to 20/6
Double Sawn	2″	23/– to 25/–
	3″	27/– to 29/–
	4″	31/– to 33/–
	6″	38/– to 40/–
	over 6″	7/– to 8/–
		per cu. ft.
Fragments		10/– per sq. yard

2. Rubble.

Random ... ... 20/– to 25/– per perch

3. Monumental Stonework—Kerbs and Sockets.

Sawn 3 sides	per lin. ft.
12″ x 6″	7/– to 7/6
14″ x 6″	8/– to 8/6
16″ x 6″	9/– to 9/6
12″ x 9″	9/– to 9/6
14″ x 9″	10/3 to 11/–
16″ x 9″	11/6 to 12/3
12″ x 14″	12/9 to 13/–
14″ x 14″	14/6 to 15/6
16″ x 14″	16/– to 17/–
18″ x 14″	17/6 to 18/6

Desks.	per lin. ft.
9″ x 18″	20/– to 21/–
10″ x 18″	21/– to 22/–
9″ x 20″	21/9 to 22/9
10″ x 20″	22/9 to 23/9
12″ x 20″	25/3 to 26/3
9″ x 22″	23/3 to 24/3
10″ x 22″	25/– to 26/–
12″ x 22″	28/6 to 29/6

Base Courses.

Sawn 4 Sides.	per lin ft.
24″ x 6″	13/9 to 14/9
30″ x 6″	16/9 to 17/9
36″ x 6″	19/9 to 20/9
24″ x 8″	16/8 to 17/8
30″ x 8″	20/– to 21/–
36″ x 8″	23/4 to 24/4

4. Grindstones.

	each
18″ dia. x 4″ th.	£2 10 0
20″ dia. x 4″ th.	£3 0 0
24″ dia. x 4″ th.	£4 10 0
30″ dia. x 4″ th.	£6 10 0
36″ dia. x 6″ th.	£8 10 0
48″ dia. x 9″ th.	£14 0 0

For further information and quotes See Advertisement Page 71.

GRANITE.

Granite is an Igneous rock formation, exceedingly hard and durable and is found in a variety of colours. Red granite is quarried at " Rob Roy " quarries, Lithgow.

When polished it is very beautiful and is used as a decorative stone in public buildings, banks, etc. It is also used, when cut into slabs and polished, as a facing to cover concrete or brick constructions, etc.

The cost of granite is estimated at per cubic foot ex quarry and polishing at per super foot of area polished. Cartage and freight is added to the cost at usual rates shown for sandstone. The labour costs of bedding or fixing facings vary according to position and accessibility of working.

Granite is also used, when polished, as rollers in paper mills, chocolate and sweet factories and monumental work. It is advisable to obtain quotes for all work in granite from the firm executing this work (See Advertisement, Page 36a for quotes).

EXAMPLE OF COSTS.

Dimension Stone—ex. quarry, 20/– per cub. foot.
Polishing, 16/– per sup. foot.
Axed Face work, 12/6 per sup. foot.
Granite Walling from £4 0s. 0d. per cubic foot.
Circular Work from £6 0s. 0d. per cubic foot.

Cartage Rates.

One cubic foot Granite Weighs 180 lbs.—Approx. 12½ cubic feet Weigh 1 ton.

Cartage 8/– per ton for first mile = 8d. per cubic foot.
Each Additional Mile, 3/– per ton = 3d. per cubic foot.

Labour Setting Dimension Stone, including Mortar from 3/– per cubic foot.

For information and Quotes See Advertisement, Page 36a.

TRACHYTE.

A light blue Trachyte is quarried at Bowral, N.S.W., and was used in the railway bridge over the Hawkesbury river to resist decay by sea water.

It has been used in many buildings in Sydney where strength and density is required. Trachyte takes a lasting polish.

It is not used as extensively as granite.

Cost of Trachyte.

The cost of quarrying, polishing, cartage and setting is approximately the same as for Granite, so for general costs of Trachyte see prices of granite.

For detailed work and quotes See Advertisement, Page 36a.

MARBLE MASON

MARBLE.

There is such a richness and variety of colour, combined with soundness, in our Australian Marbles—qualities that commend themselves to the Architect and Builder—that many of the principal Government and private buildings, also vestibules of our principal theatres, are now tastefully faced and ornamented by their introduction.

The chief marble quarries being worked at present in New South Wales are situated at Mudgee, Yass and Wombeyan Caves.

AUSTRALIAN MARBLE SLABS.

Costs—Per Square Foot—Unfixed.
Polished Faces—Square Edges.

¾ inch.	1 inch.	1¼ inches.
25/– to 27/–	29/– to 31/–	32/– to 35/–.

Polished Edges from 2/6 to 4/6 per lin. foot.
Rounded and Polished Edges from 3/6 to 5/– per lin. foot.
Scotia Moulded and Polished Edges from 5/6 to 7/6 per lin. foot.

SICILIAN MARBLE TREADS AND NOSINGS.

Rubbed Smooth on face and Nosed Edges, 1¼″ thick, 28/– to to 30/– per sq. ft.—1½″ thick, 32/– to 34/– per sq. ft. The above prices are given as a guide and **do not include fixing.**

For ruling prices of Marble and fixing costs, full particulars and advice may be obtained from the firm engaged in this work.

See Advertisement, Page 36b.

PAINTER

All branches of the building trades have undergone many changes of recent years, and painting and decorating has been no exception.

Apart from changes in taste in the matter of decorative styles, the introduction of new finishing materials, for which the paint and colour chemist has been mainly responsible, has influenced the trade to a marked degree.

New plastic materials have been utilised extensively in paint manufacture. Changes introduced have resulted in a great improvement in decorative finishes generally. Many of these materials have proved superior to types of finishes which had been commonly used in past years. Advantages of the new finishes, as compared with older types, are that they are more finely ground, of better colour, and their brushing and drying qualities have been greatly improved. Advances have not been confined to paints and enamels only, but also to water paints and kalsomines.

Better finishing materials have meant that greater emphasis has been placed upon the decorative aspect of painting.

For some years past it has been assumed that the necessity for painting arises mainly from its economic advantages.

" Save the Surface " slogans emphasize the necessity of painting exteriors of buildings and structures. While this is still recognised as of immense importance, the decorative aspect of painting is now receiving the attention it deserves.

The changed outlook today is indicated by the variety of types of decorative materials now offered the building trades. The demand on interior finishing is often more exacting than for exteriors.

Water-paints and kalsomines have not only to be decorative, but they also have to stand up to the wear and tear to which interiors of modern homes are subjected. The wide variety of special products marketed suggests the change that has occurred.

The chemist and paint manufacturer have both agreed to the desirability of widening rather than narrowing the range and variety of materials supplied.

In factories the effect of light and colour on the health and safety of factory workers is now appreciated in most industries. New paint finishes—in matt, flat or gloss effects—are now being applied to walls and floors, and machinery and equipment generally.

PAINT AS A PROTECTIVE COVERING.

The chief enemy of exposed surfaces is rot and rust. Procedure recommended, therefore, must follow accepted lines. If possible, where new construction is concerned, the aim should be to apply priming coats as soon as possible, preferably before steel work or joinery are placed in position.

For wood or metal surfaces priming coats based on white lead or red lead, or a combination of both, are best, the medium used being for woodwork, raw linseed oil and, iron and steel, boiled linseed oil. Following the priming, all cracks and nails heads should be stopped with ordinary putty ; in the case of woodwork, putty and white lead or red lead, stiffened with whiting for iron or steel. Finishing coat, in ordinary

circumstances, would be a selected ready-mixed paint or a shop made paint.

For white lead paints, raw oil is the best medium. For zinc, use pale boiled oil.

For dark colours, or in mixing dry colours, use boiled oil, preferably with varnish added.

For many purposes aluminium-based paints are now being extensively used. Aluminium may be bought in paste form. If mixed direct, the medium may be either boiled oil or varnish.

To the painter, ready-mixed paints are a convenience. They are time-saving and best grades are usually based on white lead and zinc white, in combinations.

Shop-made outside paints are based on the same pigments, brought to working consistency with raw oil, with a small quantity of driers added and turps as required.

Galvanised iron should not be painted until it has been exposed for several months. Glass-paper before priming.

Weathering should also be allowed before painting on cement or cement sheets and then it is necessary to use a good cement Sealer preparatory to undercoating and finishing.

New type water paints, especially made for painting on cement, may be applied to newly applied cement surfaces with good results.

Specially written for Mayes' " Architects, Builders and Contractors Price Book and Guide ", by the Editor of the " Decorator and Painter ", published by Bishop Bros. Pty. Ltd., 15 O'Connell Street, Sydney.

PAINTING ALUMINIUM SHEET.

Condensed from " Decorator and Painter."

Exterior Painting.

Newly manufactured Aluminium carries a light coating of oil which disappears after several weeks' exposure to weather and the painter may usually proceed after dust brushing the surface.

Spots of grease and surface weathering, however, must be removed and Mineral spirits or painter's naphtha will serve as as uitable solvent to clean the affected areas. Light sanding removes any corrosion.

If it is necessary to paint before weathering has taken place, a solution of phosphoric acid with an organic solvent such as alcohol (methylated spirit) is applied to the surface. A proprietary mixture is known as Deoxidine and is diluted with water and applied by brush or swab. After 10 minutes the surface is rinsed with clean water, and when completely dry the aluminium is ready for painting.

For the priming coat lead-free paints are recommended, although paints up to 15 per cent. lead pigment may be used. After the priming coat any exterior paint may be used.

Surfaces subjected to severe conditions or conditions of moisture such as gutters should be given two coats of Metalium or approved Aluminium paint or two coats of bituminous paint to seal the aluminium sheet against moisture.

INTERIOR PAINTING.

Interior Aluminium sheet may not have sufficient time to weather before painting, so the following procedure is recommended :—

(1) Clean surface with mineral spirits.

(2) Roughen surface with steel wool or medium sandpaper.

(3) Wipe the surface again with mineral spirits.

Do not handle surface with bare hands after cleaning as this leaves oily smudges.

INDUSTRIAL BUILDINGS.

Sometimes, the presence of chemical fume and condensed moisture requires the use of a corrosion-inhibiting primer when aluminium is used for industrial interiors. Under these conditions it is best to prepare the aluminium surface by any suitable preparation for painting, followed by a priming coat of high zinc chromate content. If conditions permit, the phosphoric acid treatment should be used instead of surface roughening followed by solvent cleaning, to assure good adherence for the protective priming coat. The concentration of the chromate in the primer can be varied, of course, with the severity of the conditions. For mildly corrosive conditions, primers containing as low as 10–20 per cent. zinc chromate mixed with iron oxide and inert pigments have given satisfactory service. Primers of various chromate concentration are available commercially.

SEALING OF JOINTS.

Where aluminium is to be used in contact with a dissimilar metal such as steel, the contacting surfaces should be properly painted to prevent electrolytic action between the two metals. The aluminium surface should be cleaned by one of the previously described methods and given a coat of zinc chromate primer. The other metal surface may be painted in the same manner or with any other appropriate metal protective paint suitable for use on that particular metal.

TREATMENT OF MOULD ON PAINTED SURFACES.

Mould is caused by dampness, poor ventilation and lack of sunlight. When it appears, wash the affected surface with a 2 per cent. solution, in water, of Dowicide A (Sodium-ortho-phenol-phenate) or Dowicide G (Sodium-penta-chlor-phenate) and also incorporate 2 per cent. of Dowicide G in the paint.

After treatment with the wash, it is advisable to wait some time before repainting, and to treat again with the wash if the mould reappears.

TO MAKE WALLS WATERPROOF.

Sylvester's Process.—Castile Soap and Alum Coats.

First Coat.—Mix ¾lb. Castile Soap to one gallon of water ; apply with brush, allow 24 hours to dry, then apply.

Second Coat.—Viz., mix ½lb. alum to 4 gal. water ; after 24 hours repeat the coats. A chemical glaze is formed which is said to be impervious for years.

COVERING CAPACITY OF FIRST QUALITY PAINTS.

Square Feet per Gallon.

Synthetic Enamels	450 to 550 according to surface.
Enamel Paints	600 to 1000 according to Colour and surface.
Flat Finish Oil Paints	800 to 1000 according to surface.
Roofing Paints	700 in colours.
„ „	1000 in silver.
Standard Undercoatings ...	650 to 800 according to surface.
Cement Sealer	400 to 500 „ „ „
Paving Paints	700
Flat Oil Stain	550
Varnish	700
Kalsomine	250 to 450 per 5 lb. packet.

METHOD OF COSTING.

There are various methods used by contractors to estimate and quote for the execution of painting, both for new work and renovations, but the method most universally used is that of working out costs on a square yard or lineal foot basis.

NEW WORK	per sq. yd.
On wood, plain surfaces :	
3 coats	5/9
4 „	6/9
Windows and Doors : measure both sides.	
3 coats	5/9
4 „	6/9
Balusters (Wood) :	
3 coats Paint	5/9
2 „ Varnish	3/9
Ornamental Woodwork, Iron Balustrading and Frieze	5/6
Venetian Shutters :	
3 coats (to be charged 3 time surface measurement of 1 side).	5/9
Trellis Work :	
3 coats, both sides	7/6
4 „ „ „	9/–
Moulding, Spouts, etc. :	per ft.
Under 6″ girth, per coat per running foot	4d.
6″ to 9″, per coat per running foot	5d.
Skirting and Chair Rails :	per sq. yd.
Double the surface and charge as plain painting.	
Staining :	
Oil stain and 2 coats Varnish	5/9
Water stain and 2 coats Varnish	5/9
Dadoes :	
Charge as plain painting.	
Wainscoting :	
Double the surface and charge as plain painting.	
French Polishing : per square foot	2/6

	per sq. yd.
Painting clean plastered walls and ceilings :	
3 coats	5/9
4 „	6/9
Lining :	
Lines up to ½″ wide per yard lineal	5d.
½″ to 1″ wide	6d.
New Cement Walls :	
Painting up to 30′ high 3 coats	5/9
Over 30′—3 coats	6/6
Metal Ceilings :	
Lightly embossed—1 coat	3/–
2 coats	4/3
3 „	5/9
Roofs (Corrugated Iron add 1/5th to area) :	
Red Oxide ...1 coat	2/9
—2 „	3/9
Lead Paint...1 „	2/9
—2 „	3/9
Underside corrugated iron—1 coat	2/9
—2 „	3/9
Overhanging Eaves :	
3 coats per running yard	5/6
Picket Fences :—measure both sides.	
At per square yard, charge as plain painting.	
Gables, Barge Boards and Roof Ventilators :	
At per square yard, charge as plain painting.	
Oiling :	
Weatherboards, 1 coat	2/9
„ 2 „	3/9

OLD WORK.

	per sq. yd.
Preparing and painting doors and windows :	
1 coat	6/9
2 „	9/6
3 „	12/–
Burning off and preparing from	3/9
Plain Surfaces :	
1 coat	2/9
2 „	3/9
3 „	4/9
Plaster Ceilings and Walls :	
1 coat	2/9
2 „	3/9
Fascias and Soffits, up to 16′ from ground :	
1 coat per yard run	2/9
2 „ „ „ „	3/9
3 „ „ „ „	5/6
From 16′ to 30′ high, 9d. per yard extra.	
Preparing and Varnishing	2/9
Washing off old Kalsomine	1/3

	per sq. yd.
Kalsomining Ceilings and Walls :	
1 Coat	1/9
2 ,, ...	2/9
Cold Water paint :	
On roughcast, 1 coat	2/3
,, plain cement walls, 1 coat	1/9
,, ,, ,, ,, 2 ,, ...	2/9
Over 20′ high, 25 per cent. extra.	
Cement-type water paint, 1 coat	2/9
2 ,, ...	3/9
Lime Washing :	
On roughcast, 1 coat	1/9
,, bricks, 1 coat	1/3
,, ,, 2 ,, ...	2/–
,, galvanised iron, 1 coat	1/3
,, underside of joists and floors, etc. 1 coat	1/9
,, ,, ,, ,, ,, ,, ,, 2 ,, ...	2/9
Frosting :	
Cleaning off	3/3
,, ,, and refrosting	5/3
Frosting only on written glass	3/3
Stripping off paper	10d.
(Two or more papers charge extra).	
Stripping varnished paper	from 3/3

SCHEDULE OF SIGNWRITING PRICES.

	each
On glass, Plain Gold Leaf Letters : including plain backing, per 1″	1/1
Mock embossed, per 1″, from	1/4
Second shade, add per 1″ additional	4d.
Plain and Gold Leaf Letters, with heavy blocking, shading and frosting (1″ to 6″) per 1″ from	1/4
Gold lines, up to 1″ in width, per foot, lineal	1/1
On Fascia :	
Plain Gold Leaf letters, 1″ to 6″ per inch from	10d.
,, ,, ,, over 6″ per 1″ from	11d.

	per sq. ft.
Advertising Spaces :	
Up to 18 sq. ft. from	2/8
,, ,, 36 ,, ,, ,, ...	1/7
,, ,, 72 ,, ,, ,, ...	1/4
,, ,, 150 ,, ,, ,, ...	1/1
Over 150 ,, ,, ,, ...	10d.

TO CLEAN PAINT WITHOUT DETERIORATING OR AFFECTING SAME.

Dip a piece of flannel or felt in hot water and powdered whiting and apply briskly.

Hot water and ammonia, a tablespoonful to a quart, wiped over surface to remove grease and dirt.

DURABLE WHITEWASH.
(American Congress Recipe.)

Used on " White House," Washington.

Slack ½ bushel of unslacked lime with boiling water, covered to keep in steam. Strain through fine sieve. Add a peck of salt previously dissolved in warm water; 3lbs. ground rice, boiled to a thin consistency; ½lb. powdered whiting; 1lb. of clean glue, previously dissolved. Boil the mixture for an hour in a small kettle inside another.

Then add 5 gals. of hot water, stir it well, stand for a few days, and put on hot with fine or coarse brush, according to finish required. It remains brilliant for many years. Colouring matter may be added if desired. 1 pint covers 1 yard.

How to Kill Grease Spots.—Before painting wash over smoky or greasy parts with saltpetre or very thin lime whitewash; if soapsuds are used they must be washed off thoroughly as they prevent the paint from drying.

PREPARED PAINTS.

Paint manufacturers, aided by research and paint chemists, have evolved and perfected types of paints suitable to all classes of work. The uniform methods of weighing, grinding, mixing and tinting prepared paints, results in a standard quality and colour, that cannot be achieved by job mixing. The result is that first grade prepared paints are finding wider popularity with master painters and decorators than ever before.

Cheap paints, generally, are not economical in the long run, and, because prices of first grade paints are competitive, users can rest assured that they embody the extra cost in quality and lasting value.

PREPARED PAINTS—GENERAL SPECIFICATIONS.

Robbialac Enamel:—Mirror Smooth Finish.—Available in 34 colours.

New Woodwork:—Inside.—Prime and undercoat with coptic flat finish and finish with 1 or 2 coats of Robbialac. Scruff Robbialac lightly between coats with fine damp sandpaper.

Outside Work:—One Coat Primer.—One coat standard undercoat and finish with Robbialac as above.

Metal Surfaces:—One coat Robbialac primer surfacer; one coat S.V.O. sanded between coats to obtain smooth surface, and finish with Robbialac as above.

Old Work:—If surface is in good condition and free from grease, dirt and wax, apply one or two coats of Robbialac—old work in bad condition should be removed and proceeded as for new work.

S.M.P. Enamel Paint:—Lustre Finish.—Available 33 colours. Washable and steam resisting qualities makes it specially suitable for bathrooms, kitchens, etc. Also made in special outdoor series.

Metalium Liquid Armour Paint:—Available in 8 colours.

Coptic Prepared Paint:—Available in 33 colours. Made to correct proportions of genuine white lead and zinc oxide.

For further information and technical advice See Advertisement, Page 79.

STERLING PAINTS—PRINCIPAL LINES. GENERAL SPECIFICATIONS.

Rayflex Long Gloss Paint (Red Label).
A new type of house paint based on tough synthetic resin. This paint has long wear and excellent gloss retention. It stands extremes of heat humidity and cold.

Rayflex Endurance Finish (Blue Label).
Superior to enamel for gloss, colour, permanence and wear. Recommended for all indoor and outdoor uses. It withstands harsh marine use.

Sterling Prepared Paint.
A non-poisonous zinc oxide base paint, carefully formulated, evenly ground and blended. It has a high gloss and wears by slow chalking—which is scientifically recognised as ensuring the best protection.

Heavy Bodied White, 60/40.
A fine blended paste regarded as an ideal combination of White Lead and Zinc Oxide. The proportion of zinc is sufficient to inhibit excessive chalking of the lead.

Sterling Mattsheen.
A stain finish for interior decoration. Recommended as an interior trim in conjunction with Hometone flat paint. Based on the same synthetic medium as Rayflex. Use with Rayflex Undercoat. Colour range is the same as Hometone.

Sterling Hometone.
A high quality flat paint for walls and ceilings, available in pastel shades. It is washable when dry. On plaster it should be applied over a coat of Sterling Sealem, and up to one pint to the gallon of Raw Linseed Oil should be added to the first coat. On previously painted surfaces one coat may be sufficient.

Sterling Pasteltone.
An efficient interior decorators' oil-emulsion paint, that can be thinned down readily with water. It dries within an hour and after a week it will stand washing. One coat is usually sufficient.

Sterling Syntone.
An oil-water emulsion paint made on a synthetic base, especially suitable for fibro, cement, plaster, and brick surfaces. Syntone can be thinned with water up to 50 per cent. (2 parts to 1 part water). It covers most surfaces in one coat and no sealer is required. Primarily designed for exterior use, it can also be effectively used for interiors.

Sterling Varnishes.
Comprise all types of industrial and domestic varnishes, including highly specialised insulating varnishes, furniture varnishes, marine varnishes, domestic oil varnish stains, and spirit stains, etc.

Paint Problems and Special Lines.
The Sterling Advisory Bureau is always pleased to answer queries on any aspect of painting. Make use of the Bureau at any time and without obligation.

See Advertisement, Page 43a.

FOR PLASTERERS, PAINTERS, PAPER-HANGERS, TUCK-POINTERS AND SURFACES OF EVERY DESCRIPTION.

Table showing number of square yards of wall surface in rooms of various sizes, *including* square yards of ceiling for same.

Square Yards and Feet of Walls in Rooms of various sizes 7-foot High, including Sq. Yards in Ceilings.

Size in feet	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	10·3	12·2	14·1	16·0	17·8	19·7	21·6	23·5	25·4	27·3	29·2	31·1	33·0	34·8	36·7	38·6	40·5	42·4	44·3	46·2
4	12·2	14·2	16·2	18·2	20·2	22·2	24·2	26·2	28·2	30·2	32·2	34·2	36·2	38·2	40·2	42·2	44·2	46·2	48·2	50·2
5	14·1	16·2	18·3	20·4	22·5	24·6	26·7	28·8	31·0	33·1	35·2	37·3	39·4	41·5	43·6	45·7	47·8	50·0	52·1	54·2
6	16·0	18·2	20·4	22·6	24·8	27·1	29·3	31·5	33·7	36·0	38·2	40·4	42·6	44·8	47·1	49·3	51·5	53·7	55·8	58·2
7	17·8	20·2	22·5	24·8	27·2	29·5	31·8	34·2	36·5	38·8	41·2	43·5	45·8	48·2	50·5	52·8	55·2	57·5	59·8	62·2
8	19·7	22·2	24·6	27·1	29·5	32·0	34·4	36·8	39·3	41·7	44·2	46·6	49·1	51·5	54·0	56·4	58·8	61·3	63·7	66·2
9	21·6	24·2	26·7	29·3	31·8	34·4	37·0	39·5	42·1	44·6	47·2	49·7	52·3	54·8	57·4	60·0	62·5	65·1	67·6	70·2
10	23·5	26·2	28·8	31·5	34·2	36·8	39·5	42·2	44·8	47·5	50·2	52·8	55·5	58·2	60·8	63·5	66·2	68·8	71·5	74·2
11	25·4	28·2	31·0	33·7	36·5	39·3	42·1	44·8	47·6	50·4	53·2	56·0	58·7	61·5	64·3	67·1	69·8	72·6	75·4	78·2
12	27·3	30·2	33·1	36·0	38·8	41·7	44·6	47·5	50·4	53·3	56·2	59·1	62·0	64·8	67·7	70·6	73·5	76·4	79·3	82·2
13	29·2	32·2	35·2	38·2	41·2	44·2	47·2	50·2	53·2	56·2	59·2	62·2	65·2	68·2	71·2	74·2	77·2	80·2	83·2	86·2
14	31·1	34·2	37·3	40·4	43·5	46·6	49·7	52·8	56·0	59·1	62·2	65·3	68·4	71·5	74·6	77·7	80·8	84·0	87·1	90·2
15	33·0	36·2	39·4	42·6	45·8	49·1	52·3	55·5	58·7	62·0	65·2	68·4	71·6	74·8	78·1	81·3	84·5	87·7	91·0	94·2
16	34·8	38·2	41·5	44·8	48·2	51·5	54·8	58·2	61·5	64·8	68·2	71·5	74·8	78·2	81·5	84·8	88·2	91·5	94·8	98·2
17	36·7	40·2	43·6	47·1	50·5	54·0	57·4	60·8	64·3	67·7	71·2	74·6	78·1	81·5	85·5	88·4	91·8	95·3	98·7	102·2
18	38·6	42·2	45·7	49·3	52·8	56·4	60·0	63·5	67·1	70·6	74·2	77·7	81·3	84·8	88·4	92·0	95·5	99·1	102·6	106·2
19	40·5	44·2	47·8	51·5	55·2	58·8	62·5	66·2	69·8	73·5	77·2	80·8	84·5	88·2	91·8	95·5	99·2	102·8	106·5	110·2
20	42·4	46·2	50·0	53·7	57·5	61·3	65·1	68·8	72·6	76·4	80·2	84·0	87·7	91·5	95·3	99·1	102·8	106·6	110·4	114·0

Side Walls and includes Ceilings.

Directions to Use Table :—EXAMPLE.—Say room 19ft. x 13ft. x 7ft. high to ceiling or plate rail. Take 19 (in 7ft. high table) and follow along 13 line to junction, read 77·2 sq. yds., viz., total number of square yards on walls and ceiling. Multiply 19ft. x 13ft. ÷ 9 = 27·4 sq. yds. in ceiling—77·2—27·4 = 49·8 sq. yds. in walls.

Square Yards and Feet of Walls in Rooms 8-foot high including Sq. Yards in Ceilings.

Size in feet	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	11·6	13·7	15·8	18·0	20·1	22·2	24·3	26·4	28·5	30·6	32·7	34·8	37·0	39·1	41·2	43·3	45·4	47·4	49·6	51·7
4	13·7	16·0	18·2	20·4	22·6	24·8	27·1	29·3	31·5	33·7	36·0	38·2	40·4	42·6	44·8	47·1	49·3	51·5	53·7	56·0
5	15·8	18·2	20·5	22·8	25·2	27·5	29·8	32·2	34·5	36·8	39·2	41·5	43·8	46·2	48·5	50·8	53·2	55·5	57·8	60·2
6	18·0	20·4	22·8	25·3	27·7	30·2	32·6	35·1	37·5	40·0	42·4	44·8	47·3	49·7	52·2	54·6	57·1	59·5	62·0	64·4
7	20·1	22·6	25·2	27·7	30·3	32·8	35·4	38·0	40·5	43·1	45·6	48·2	50·7	53·3	55·8	58·4	61·0	63·5	66·1	68·9
8	22·2	24·8	27·5	30·2	32·8	35·5	38·2	40·8	43·5	46·2	48·8	51·5	54·2	56·8	59·5	62·2	64·8	67·5	70·2	72·8
9	24·3	27·1	29·8	32·6	35·4	38·2	41·0	43·7	46·5	49·3	52·1	54·8	57·6	60·4	63·2	66·0	68·7	71·5	74·3	77·1
10	26·4	29·3	32·2	35·1	38·0	40·8	43·7	46·6	49·5	52·4	55·3	58·2	61·1	64·0	66·8	69·7	72·6	75·5	78·4	81·3
11	28·5	31·5	34·5	37·5	40·5	43·5	46·5	49·5	52·5	55·5	58·5	61·5	64·5	67·5	70·5	73·5	76·5	79·5	82·5	85·5
12	30·6	33·7	36·8	40·0	43·1	46·2	49·3	52·4	55·5	58·6	61·7	64·8	68·0	71·1	74·2	77·3	80·4	83·5	86·6	89·7
13	32·7	36·0	39·2	42·4	45·6	48·8	52·1	55·3	58·5	61·7	65·0	68·2	71·4	73·6	77·8	81·1	84·3	87·5	90·7	94·0
14	34·8	38·2	41·5	44·8	48·2	51·5	54·8	58·2	61·5	64·8	68·2	71·5	74·8	78·2	81·5	84·8	88·2	91·5	94·8	98·2
15	37·0	40·4	43·8	47·3	50·7	54·2	57·6	61·1	64·5	68·0	71·4	74·8	78·3	81·7	85·2	88·6	92·1	95·5	99·0	102·4
16	39·1	42·6	46·2	49·7	53·3	56·8	60·4	64·0	67·5	71·1	74·6	78·2	81·7	85·3	88·8	92·4	96·0	99·5	103·1	106·6
17	41·2	44·8	48·5	52·5	55·8	59·5	63·2	66·8	70·5	74·2	77·8	81·5	85·2	88·8	92·5	96·2	99·8	103·5	107·2	110·8
18	43·3	47·1	50·8	54·6	58·4	62·2	66·0	69·7	73·5	77·3	81·1	84·8	88·6	92·4	96·2	100·0	103·7	107·5	111·3	115·1
19	45·4	49·3	53·2	57·1	61·0	64·8	68·7	72·6	76·5	80·4	84·3	88·2	92·1	96·0	99·8	103·7	107·6	111·5	115·4	119·3
20	47·5	51·5	55·5	59·5	63·5	67·5	71·5	75·5	79·5	83·5	87·5	91·5	95·5	99·5	103·5	107·5	111·5	115·4	119·5	123·5
21	49·6	53·7	57·8	62·0	66·1	70·2	74·3	78·4	82·5	86·6	90·7	94·8	99·0	103·1	107·2	111·3	115·4	119·5	123·6	127·7
22	51·7	56·0	60·2	64·4	68·8	72·8	77·1	81·3	85·5	89·7	94·0	98·2	102·4	106·6	110·8	115·1	119·3	123·5	127·7	132·0
23	53·8	58·2	62·5	66·8	71·2	75·5	79·8	84·2	88·5	92·8	97·2	110·5	105·8	110·2	114·5	118·8	123·2	127·5	131·8	136·2
24	56·0	60·4	64·8	69·3	73·7	78·2	82·6	87·1	91·5	96·0	100·4	104·8	109·3	113·7	118·2	122·6	127·1	131·5	136·0	140·4

Multiply or Deduct Area of Ceilings if Walls only are required.

Sizes and Square Yards and Feet of Walls in Rooms 9-foot high, including Ceilings.

Size	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	13·0	15·3	17·6	20·0	22·3	24·6	27·0	29·3	31·6	34·0	36·3	38·6	41·0	43·3	45·6	48·0	50·3	52·6	55·0	57·3
4	15·3	17·7	20·2	22·6	25·1	27·5	30·0	32·4	34·8	37·3	39·7	42·2	44·6	47·1	49·5	52·0	54·4	56·8	59·3	61·7
5	17·6	20·2	22·7	25·3	27·8	30·4	33·0	35·5	38·1	40·6	43·2	45·7	48·3	50·8	53·4	56·0	58·5	61·1	63·6	66·2
6	20·0	22·6	25·3	28·0	30·6	33·3	36·0	38·6	41·3	44·0	46·6	49·3	52·0	54·6	57·3	60·0	63·5	65·4	68·0	70·6
7	22·3	25·1	27·8	30·6	33·4	36·2	39·0	41·7	44·5	47·3	50·1	52·8	55·6	58·4	61·2	64·0	66·7	69·5	72·3	75·5
8	24·6	27·5	30·4	33·3	36·2	39·1	42·0	44·8	47·7	50·6	53·5	56·4	59·3	62·2	65·1	68·0	70·8	73·7	77·6	79·1
9	27·0	30·0	33·0	36·0	39·0	42·0	45·0	48·0	51·0	54·0	57·0	60·0	63·0	66·0	69·0	72·0	75·0	78·0	81·0	84·0
10	29·3	32·4	35·5	38·6	41·7	44·8	48·0	52·0	54·2	57·3	60·4	63·5	88·6	69·7	72·8	76·0	79·1	82·2	85·3	88·4
11	31·6	34·8	38·1	41·3	44·5	47·7	51·0	54·2	57·4	60·6	63·8	67·1	70·3	73·5	76·7	80·0	83·2	86·4	89·6	92·8
12	34·0	37·3	40·6	44·0	47·3	50·6	54·0	57·3	60·6	64·0	67·3	70·6	74·0	77·3	80·6	84·0	87·3	90·6	94·0	97·3
13	36·3	39·7	43·2	46·6	50·1	53·5	57·0	60·4	63·8	67·3	70·7	74·2	77·6	81·1	84·5	88·0	91·4	94·8	98·3	101·7
14	38·6	42·2	45·7	49·3	52·8	56·4	60·0	63·5	67·1	70·6	74·2	77·7	81·3	84·8	88·4	92·0	95·5	99·1	102·6	106·2
15	41·0	44·6	48·3	52·0	55·6	59·3	63·3	66·6	70·3	74·0	77·6	81·3	85·0	88·6	92·3	96·0	99·6	103·3	107·0	111·6
16	43·3	47·1	50·8	54·6	58·4	62·2	66·0	69·7	73·5	77·3	81·1	84·8	88·6	92·4	96·2	100·0	103·7	107·5	111·3	115·1
17	45·6	49·5	53·4	57·3	61·2	65·1	69·0	72·8	76·7	80·6	84·5	88·4	92·3	96·2	100·4	104·0	107·8	111·7	115·6	119·5
18	48·0	52·0	56·0	60·0	64·0	68·0	72·0	76·0	80·0	84·0	88·0	92·0	96·0	100·0	104·0	108·0	112·0	116·0	120·0	124·0
19	50·3	54·4	58·5	62·6	66·7	70·8	75·0	79·1	83·2	87·3	91·4	95·5	99·6	103·7	107·8	112·0	116·1	120·2	124·3	128·4
20	52·6	58·6	61·1	65·3	69·5	73·7	78·0	82·2	86·4	90·6	94·8	99·1	103·3	107·5	111·7	116·0	120·2	124·4	128·6	132·8
21	55·0	59·3	63·6	68·0	72·3	76·6	81·0	85·3	89·6	94·0	98·3	102·6	107·0	111·3	115·6	120·0	124·3	128·6	134·3	137·3
22	57·3	61·7	66·2	70·6	75·1	79·5	84·0	88·4	92·8	97·3	101·7	106·2	111·6	115·1	121·5	124·0	128·4	132·8	137·3	141·7
23	59·6	64·2	68·7	73·3	77·8	82·4	87·0	91·5	95·1	100·6	105·2	109·7	114·3	118·8	123·4	128·0	132·5	137·0	141·6	146·2
24	62·0	66·6	71·3	76·0	80·6	85·3	90·0	94·6	99·3	104·0	108·6	113·3	118·0	122·6	127·3	132·0	136·6	143·1	146·0	150·6

If Ceilings not required, multiply sizes and Deduct.

Square Yards and Feet of Walls in Rooms 10-foot high, including Ceilings.

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	14·3	16·8	19·4	22·0	24·5	27·1	29·6	32·2	34·7	37·3	39·8	42·4	45·0	47·5	50·1	52·6	55·2	57·7	60·3	62·8
4	16·8	19·5	22·2	24·8	27·5	30·2	32·8	35·5	38·2	40·8	43·5	46·2	48·8	51·5	54·2	56·8	59·5	62·2	64·8	67·5
5	19·4	22·2	25·0	27·7	30·5	33·3	36·1	38·8	41·6	44·4	47·2	50·0	52·7	55·5	58·3	61·1	63·8	66·6	69·4	72·2
6	22·0	24·8	27·7	30·6	33·5	36·4	39·3	42·2	45·1	48·0	50·8	53·7	56·6	59·5	62·4	65·3	68·2	71·1	74·0	76·8
7	24·5	27·5	30·5	33·5	36·5	39·5	42·5	45·5	48·5	51·5	54·5	57·5	60·5	63·5	66·5	69·5	72·5	75·5	78·5	81·5
8	27·1	30·2	33·3	36·4	39·5	42·6	45·7	48·8	52·0	55·1	58·2	61·3	64·4	67·5	70·6	73·7	76·8	80·0	83·1	86·2
9	29·6	32·8	36·1	39·3	42·5	45·7	49·0	52·2	55·4	58·6	61·8	65·1	68·3	71·5	74·7	78·0	81·2	84·4	87·6	90·8
10	32·3	35·5	38·8	42·2	45·5	48·8	52·2	55·5	58·8	62·2	65·5	68·8	72·2	75·5	78·8	82·2	85·5	88·8	92·2	95·5
11	34·7	38·2	41·6	45·1	48·5	52·0	55·4	58·8	62·3	65·7	69·2	72·6	76·1	79·5	83·0	86·4	89·8	93·3	96·7	100·2
12	37·3	40·8	44·4	48·0	51·5	55·1	58·6	62·2	65·7	69·3	72·8	76·4	80·0	83·5	87·1	90·6	94·2	97·7	101·3	104·8
13	39·8	43·5	47·2	50·8	54·5	58·2	61·8	65·5	69·2	72·8	76·5	80·2	83·8	87·5	91·2	94·8	98·5	102·2	105·8	109·5
14	42·4	46·2	50·0	53·7	57·5	61·3	65·1	68·8	72·6	76·4	80·2	84·0	87·7	91·5	95·3	99·1	102·8	106·6	110·4	114·2
15	45·0	48·8	52·7	56·6	60·5	64·4	68·3	72·2	76·1	80·0	83·8	87·7	91·6	95·5	99·4	103·3	107·2	111·1	115·0	118·8
16	47·5	51·5	55·5	59·5	63·5	67·5	71·5	75·5	79·5	83·5	87·5	91·5	95·5	99·5	103·5	107·5	111·5	115·5	119·5	123·5
17	50·1	54·2	58·3	62·4	66·5	70·6	74·7	78·8	83·0	87·1	91·2	95·3	99·4	103·5	107·6	111·7	115·8	120·0	124·1	128·2
18	52·6	56·8	61·1	65·3	69·5	73·7	78·0	82·2	86·4	90·6	94·8	99·1	103·3	107·5	111·7	116·0	120·2	124·4	128·6	132·8
19	55·2	59·5	63·8	68·2	72·5	76·8	81·2	85·5	89·8	94·2	98·5	102·8	107·2	111·5	115·8	120·2	124·5	128·8	133·2	137·5
20	57·7	62·2	66·6	71·1	75·5	80·0	84·4	88·8	93·3	97·7	102·2	106·6	111·1	115·5	120·0	124·4	128·8	133·3	137·7	142·2
21	60·3	64·8	69·4	74·0	78·5	83·1	87·6	92·2	96·7	101·3	105·8	110·4	115·0	119·5	124·1	128·6	133·2	137·7	142·3	146·8
22	62·8	67·5	72·2	76·8	81·5	86·2	90·8	95·5	100·2	104·8	109·5	114·2	118·8	123·5	128·2	132·8	137·5	142·2	146·8	151·5
23	65·4	70·2	75·0	79·7	84·5	89·3	94·1	98·8	103·6	108·4	113·2	118·0	122·7	127·5	132·3	137·1	141·8	146·6	151·4	156·2
24	68·0	72·8	77·7	82·6	87·5	92·4	97·3	102·2	107·1	112·1	114·8	121·8	126·7	131·5	136·4	141·3	146·2	151·1	156·0	160·8

Square Yards and Feet of Walls in Rooms 11-foot high, including Ceilings.

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	15·6	18·4	21·2	24·0	26·7	29·5	32·3	35·1	37·8	40·6	43·4	46·2	49·0	51·7	54·5	57·3	60·1	62·8	65·5	68·4
4	18·4	21·3	24·2	27·1	30·0	32·8	35·7	38·6	41·5	44·4	47·3	50·2	53·1	56·0	58·8	61·7	64·6	67·5	70·4	73·6
5	21·2	24·2	27·2	30·2	33·2	36·2	39·2	42·2	45·2	48·2	51·2	54·2	57·2	60·2	63·2	66·2	69·2	72·2	75·2	78·2
6	24·0	27·1	30·2	33·3	36·4	39·5	42·6	45·7	48·8	52·0	55·1	58·2	61·3	64·4	67·5	70·6	73·7	76·8	80·0	83·1
7	26·7	30·0	33·2	36·4	39·6	42·8	46·1	49·3	52·5	55·7	59·0	62·2	65·4	68·6	71·8	75·1	78·3	81·5	84·7	88·0
8	29·5	32·8	36·2	39·5	42·8	46·2	49·5	52·8	56·2	59·5	62·8	66·2	69·5	72·8	76·2	79·5	82·8	86·2	89·5	92·8
9	32·3	35·7	39·2	42·6	46·1	49·5	53·0	56·4	59·8	63·3	66·7	70·2	73·6	77·1	80·5	84·0	87·4	90·8	94·3	96·7
10	35·1	38·6	42·2	45·7	49·3	52·8	56·4	60·0	63·5	67·1	70·6	74·2	77·7	81·3	84·8	88·4	92·0	95·5	99·1	102·6
11	37·8	41·5	45·2	58·8	52·5	56·2	59·8	63·5	67·2	70·8	74·5	78·2	81·8	85·5	89·2	92·8	96·5	100·2	103·8	107·5
12	40·6	44·4	48·2	52·0	55·7	59·5	63·3	67·1	70·8	74·6	78·4	82·2	86·0	89·7	93·5	97·3	101·1	104·8	118·6	112·3
13	43·4	47·3	51·2	55·1	59·0	62·8	66·7	70·6	74·5	78·4	82·3	86·2	90·1	94·0	97·8	101·7	105·6	109·5	113·4	117·4
14	46·2	50·2	54·2	58·2	62·2	66·2	70·2	74·2	78·2	82·2	86·2	90·2	94·2	98·2	102·2	106·2	110·2	114·2	118·2	122·2
15	49·0	53·1	57·2	61·3	65·4	69·5	73·6	77·7	81·8	86·0	90·1	94·2	98·3	102·4	106·5	110·6	114·7	118·8	123·0	127·1
16	51·7	56·0	60·2	64·4	68·6	72·8	77·1	81·3	85·5	89·7	94·0	98·2	102·4	106·6	110·8	115·1	119·3	123·5	127·7	132·0
17	54·5	58·8	63·2	67·5	71·8	76·2	80·5	84·8	89·2	93·5	97·8	102·2	106·5	110·8	115·2	119·5	123·8	128·2	132·5	136·8
18	57·3	61·7	66·2	70·6	75·1	79·5	84·0	88·4	92·8	97·3	101·7	106·2	110·6	115·1	119·5	124·0	128·4	132·8	137·3	141·7
19	60·1	64·6	69·2	73·7	78·3	82·8	87·4	92·0	96·5	101·1	105·6	110·2	114·7	119·3	123·8	128·4	133·0	137·5	142·1	146·6
20	62·8	67·5	72·2	76·8	81·5	86·2	90·8	95·5	100·2	104·8	109·5	114·2	118·8	123·5	128·2	132·8	137·5	142·2	146·8	151·5
21	65·6	70·4	75·2	80·0	84·7	89·5	94·3	99·1	103·8	108·6	113·4	118·2	123·0	127·7	132·5	137·3	142·1	146·8	151·6	156·4
22	68·4	73·3	78·2	83·1	88·0	92·8	97·7	102·6	107·5	112·4	117·3	122·2	127·1	132·0	136·8	141·7	146·6	151·5	156·4	161·3

Deduct size of Ceilings if not required.

Halls and Passages.—If *Through* are taken, deduct twice width by height.

Divide by 9 for yards, and deduct from table.

If *walls* alone are required, multiply the length and breadth of wall taken, divide by 9 for yards, and deduct from table.

Square Yards and Feet of Walls in Rooms 12-foot high, including Ceilings.

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3 ...	17·0	20·0	23·0	26·0	29·0	32·0	35·0	38·0	41·0	44·0	47·0	50·0	53·0	56·0	59·0	62·0	65·0	68·0	71·0	74·0
4 ...	20·0	23·1	26·2	29·3	32·4	35·5	38·6	41·7	44·8	48·0	51·1	54·2	57·3	60·4	63·5	66·6	69·7	72·8	76·0	79·1
5 ...	23·0	26·2	29·4	32·6	35·8	39·1	42·3	45·5	48·7	52·0	55·2	58·4	61·6	64·8	68·1	71·3	74·5	77·7	81·0	84·2
6 ...	26·0	29·3	32·6	36·0	39·3	42·6	46·0	49·3	52·6	56·0	59·3	62·6	66·0	69·3	72·6	76·0	79·3	82·6	86·0	89·3
7 ...	29·0	32·4	35·8	39·3	42·7	46·2	49·6	53·1	56·5	60·0	63·4	66·8	70·3	73·7	77·2	80·6	84·4	87·5	91·0	94·4
8 ...	32·0	35·5	39·1	42·6	46·2	49·7	53·3	56·8	60·4	64·0	67·5	71·1	74·6	78·2	81·7	85·3	88·8	92·4	96·0	99·5
9 ...	35·0	38·6	42·3	46·0	49·0	53·3	57·0	60·6	64·3	68·0	71·6	75·3	79·0	82·6	86·3	90·0	93·6	97·3	101·0	104·6
10 ...	38·0	41·7	45·5	49·3	53·0	56·8	60·6	64·4	68·2	72·0	75·7	79·5	83·3	87·1	90·8	94·6	98·4	102·2	106·0	109·7
11 ...	41·0	44·8	48·7	52·6	56·5	60·4	64·3	68·2	72·1	76·0	79·8	83·7	87·6	91·5	95·4	99·3	103·2	107·1	111·0	114·8
12 ...	44·0	48·0	52·0	56·0	60·0	64·0	68·0	72·0	76·0	80·0	84·0	88·0	92·0	96·0	100·0	104·0	108·0	112·0	116·0	120·0
13 ...	47·0	51·1	55·2	59·3	63·4	67·5	71·6	75·7	79·8	84·0	88·1	92·2	96·3	100·4	104·5	108·6	112·7	116·8	121·0	125·1
14 ...	50·0	54·2	58·4	62·6	66·8	71·1	75·3	79·5	83·7	88·0	92·2	96·4	100·6	104·8	109·1	113·3	117·5	112·7	126·0	130·2
15 ...	53·0	57·3	61·6	66·0	70·3	74·6	79·0	83·3	87·6	92·0	96·3	100·6	105·0	109·3	113·6	118·0	122·3	126·6	131·0	135·3
16 ...	56·0	60·4	64·8	69·3	73·7	78·2	82·6	87·1	91·5	96·0	100·4	104·8	109·3	133·7	118·2	122·6	127·1	131·5	136·0	140·4
17 ...	59·0	63·5	68·1	72·6	77·2	81·7	86·3	90·8	95·4	100·0	104·5	109·1	113·6	118·2	122·7	127·3	131·8	136·4	141·0	145·5
18 ...	62·0	66·6	71·3	76·0	80·6	85·3	90·0	94·6	99·3	104·0	108·6	113·3	118·0	122·6	127·3	132·0	136·6	141·3	146·0	150·6
19 ...	65·0	69·7	74·5	79·3	84·1	88·8	93·6	98·4	103·2	108·0	112·7	117·5	122·3	127·1	131·8	136·6	141·4	146·2	151·0	155·7
20 ...	68·0	72·8	77·7	82·6	87·5	92·4	97·3	102·2	107·1	112·0	116·8	121·7	126·6	131·5	136·4	141·3	146·2	151·1	156·0	160·8
21 ...	71·0	76·0	81·0	86·0	91·0	96·0	101·0	106·0	111·0	116·0	121·0	126·0	131·0	136·0	141·0	146·0	151·0	156·0	161·0	166·0
22 ...	74·0	79·1	84·2	89·3	94·4	99·5	104·6	109·7	114·8	120·0	125·1	130·2	135·3	140·4	145·5	150·6	155·7	160·8	166·0	171·1

PAPER HANGER.

Modern wallpapers present an infinite variety of beautiful designs and colourings and are available in textures, florals, satins, polka dots, wood effects, stripes and period designs. The bulk of wallpapers in Australia are manufactured in England, and quantities are estimated on **English Standard Rolls.** A standard roll or " piece " is 21 inches wide and 11½ yards long, with an approximate coverage of 60 square feet. **Double Rolls 30 inch width wallpapers** have a length of 15 yards, but are usually retailed per single roll of 7½ yards, with approximate coverage of 55 square feet. These rolls do not cover as much as the Standard Roll.

COSTING.

The costs of wall paper vary according to design and type of paper used and also the labour costs vary according to type of paper used.

The inclusion of door and window openings compensates for the waste in matching the ends for continuity of pattern.

In walls with no openings a margin of waste must be allowed to match the patterns.

The labour cost of hanging average types of paper are given and to this must be added the cost of paper, waste, oncosts and profit.

LABOUR HANGING PER ROLL.

Pulps from 8/– per roll.
Grounds and Satins from 10/– per roll.
Metals, Silks, etc., from 10/– per roll.
Lining Papers from 4/– per roll.

In heavy embossed papers, flocks and special decorations the labour costs may reach as high as 30/– per roll.

Wallpapers—various—from 3/6 to £5 per roll.
Friezes, 2″ to 6″ widths—from 3d. to 3/– per yard.
Straight borders, ½″ to 4″ widths—from 2d. to 1/6 per yard.
Panel or Stiling Borders.—Widths from 4″ to 10″. Prices from 8d. to 2/6 per yard.

Corner Decorations.—Cut out fancy motifs. Prices from 2/– to 5/– per pair.

Pastes.—A dry powder paste such as " Stix," readily mixes with cold water and is used in modern practice.

Trimming.—Tradesmen use straight edge cutter and zinc strip outfits to trim selvedge of papers, but large distributors dry trim selvedge for home paper hangers for about 6d. per roll.

" Ridgely " trimming outfits, £5 2s. 0d. complete.

For choice of Wallpapers and advice See Advertisement, Page 82.

TABLE OF STANDARD ROLLS REQUIRED.
WALLS AND CEILINGS.
Measure round the walls in feet, including openings.

Measurements Round Room	Height in feet from Skirting to Cornice										Ceiling (Pieces)	Border (Yds.)
	5	7–7½	7½–8	8–8½	8½–9	9–9½	9½–10	10–10½	10½–11	11–11½	Number of Pieces Required.	
28 feet ...	3	4	4	4	4	4	5	5	5	5	1	10
32 „ ...	4	4	4	5	5	5	5	5	6	6	2	11
36 „ ...	4	5	5	5	5	6	6	6	7	7	2	12
40 „ ...	5	5	5	6	6	6	7	7	7	8	2	14
44 „ ...	5	6	6	6	7	7	7	8	8	8	3	15
48 „ ...	6	6	6	7	7	7	8	8	9	9	3	16
52 „ ...	6	7	7	7	8	8	9	9	9	10	3	18
56 „ ...	6	7	8	8	8	9	9	10	10	10	4	19
60 „ ...	7	8	8	8	9	9	10	10	11	11	4	20
64 „ ...	7	8	9	9	9	10	10	11	11	12	5	22
68 „ ...	8	9	9	9	10	10	11	12	12	13	5	23
72 „ ...	8	9	10	10	11	11	12	12	13	13	6	24
76 „ ...	9	9	10	10	11	12	12	13	13	14	7	26
80 „ ...	9	10	11	11	12	12	13	14	14	15	7	27
84 „ ...	9	10	11	12	12	13	14	14	15	16	8	28
88 „ ...	10	11	12	12	13	14	14	15	16	16	9	30
92 „ ...	10	11	12	13	13	14	15	16	16	17	9	31
96 „ ...	10	12	13	13	14	15	15	16	17	18	10	32
100 „ ...	11	12	13	14	14	15	16	17	18	18	11	34

TERRA COTTA

Terra Cotta Lumber, having passed through 2,000 to 2,500 deg. Fahrenheit, is suitable for fireproof ceilings, floors, girder casing, column casing, and partitions. Absolutely **no shrinking,** and is fire and sound proof.

These hollow blocks are much lighter than solid brickwork; its crushing weight is 840 lbs. per sq. in. It will also readily receive nails driven into it.

Terra Cotta Lumber partitions bond in with every three courses of brickwork.

SIZES AND WEIGHTS.

Size of Blocks	Thickness	No. per ton	No. per sq. yd.	Weight per sq. yd. Lbs.
12″ x 6⅜″ (Grooved)	3″	249	17	153
12″ x 9¾″ (Tongued & grooved)	4″	130	11	187
12″ x 6⅜″ (Grooved)	6″	125	17	289

Approximate Cost—Laid—Per Square Yard—Including Mortar. Metropolitan Area.

Thickness	3″	4″	6″
T.C. Lumber ...	8/–	9/6	13/6
Labour Laying ...	5/–	6/–	7/–
Nett cost per super yd.	13/–	15/6	20/6

COKE BREEZE BLOCKS.
Partition Walls.

Coke Breeze blocks, being lighter than bricks, are often used, bedded on steel girders, for partition walls in flats and storey buildings of all kinds.

They are sound resistant and, when plastered, cannot be detected from brickwork.

Made in various thicknesses to suit garage construction, cooling chambers, front fences, etc. 10 blocks to sq. yard.

Size of blocks 18½″ x 6½″ to bond with brickwork.

Examples of Cost—Per Sq. Yard.

Thickness	2″	3″	4″	5″	6″	6½″
Materials	7/9	8/9	9/6	13/6	14/6	15/6
Labour Laying ...	5/–	5/6	6/6	7/–	7/6	8/–
Nett cost per sq. yard	12/9	14/3	16/–	20/6	22/–	23/6

Add extra raising blocks for Storey Work.

(Weights of Coke Breeze Blocks).

Thickness	2″	3″	4″	5″	6″	
Approx. Weight dry per yard	80	120	160	200	240	lbs.
,, Yards per ton ...	28	18	14	11	9	
,, tons per yard ...	·035	·055	·07	·10	·12	

INVISIBLE GAS FIRE FLUES.

These hollow blocks (approved by gas company) are specially made to act as flues and are perfectly safe for building into brickwork and asbestos cement construction.

Made in sizes $13\frac{3}{4}$″ x $6\frac{1}{4}$″ (2 courses) x $4\frac{1}{2}$″ wide.
and $13\frac{3}{4}$″ x $12\frac{1}{2}$″ (4 courses) x $4\frac{1}{2}$″ wide.

Cost.

2 course size 5/– each : laying 1/– = 6/– per block.
4 course size 10/– each : laying 1/6 = 11/6 per block.

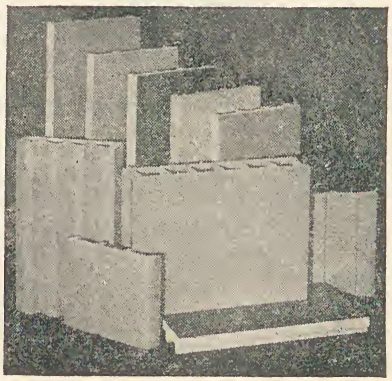
CERAMIC VENEER.

Glazed Colourful Facing for Buildings.

Ceramic Veneer is a permanent colourful glazed facing material or trim to all types of buildings. It presents a non-porous glazed surface and is available in a variety of finishes and an almost unlimited range of plain and mottled colours.

Ceramic Veneer is manufactured in square or rectangular ashlar slabs and plain moulded sections from $1\frac{1}{2}$″ to 2″ thick overall, glazed in selected colours on the exposed face and edges. Desirable block sizes do not exceed 16″ in either dimension.

The application of Ceramic Veneer to a building is straightforward ; complete details are available from the manufacturer—see advertisement, inside front cover.



PLASTERER

Modern Plastering methods have changed from the lime and sand floating of walls to a cement technique, but should it be necessary in country areas or elsewhere, through shortage of cement, the lime and sand may still be used.

When lime and sand is used, the lime must be slaked in an old bath or tub and screened through a fine sieve into the sand ring. It is then thoroughly mixed with the sand and left to stand 14 days before use. This ensures the " pickles " of lime to slake, and so prevents the walls " blowing ".

The cement and sand " floating " or " rendering " of walls makes a harder finish and may be left as a sandpaper finish, to take wallpaper, or set in the usual way with a setting coat of lime putty and plaster.

Setting with Lime Putty.—For first class setting, gauge three of Hard Finish Plaster to one of lime putty.

" DRY-OUTS."

Cause.—Excessive evaporation of water from the plaster before set has taken place. Thus, water needed for crystallization is lost and the plaster cannot harden properly. By far the greater number of plaster troubles during hot summer months are " dry-outs ".

How to detect.—Dried-out walls are soft, crumbly and of a light chalky appearance. If the condition is a partial dry-out, as is usually the case, the dried-out portion of the wall will appear as chalky light coloured spots, usually more numerous over openings, whereas the portions of the wall that are set will be darker coloured and hard. After two or three days the entire wall will grow lighter in colour. However, dried-out places, if not attended to, will always be somewhat lighter and softer than the set places, and cracks will probably also appear.

HOW TO PREVENT " DRY-OUTS "

1. Always cover the openings before plastering in warm weather so that the hot winds cannot strike the walls.
2. Wet base coat thoroughly the day before and again one hour before applying plaster.
3. Apply plaster to proper thickness, because a thin coat of plaster is much more liable to dry-out.

HOW TO REMEDY " DRY-OUTS "

Dried-out plaster need not be torn from walls for it is chemically identical with neat plaster and can be made to set up as strong and hard as any plaster. Use a spray pump or garden hose with a spray nozzle, and spray the dried out parts thoroughly with water.

When using the hose, reduce pressure so that no plaster will be washed off. Spray every dried out part of the wall systematically. After the plaster has stopped absorbing water, shown by excess water running down the walls in little streams, or appearing on the surface in drops, stop spraying. In about two hours, again inspect the walls, and if not completely set spray as before. Do not become discouraged—it may require several applications of water to set up the walls. Remember that plaster must set in time if it is kept wet. When plaster is set and thoroughly dry, " sound " the walls.

When dry-out spots are very small, and a spray pump or hose is not available, water may be whipped on from a plasterer's brush.

This method will not supply sufficient water for large " dry-outs ". Should the application of water be too slow or ineffective, mix 12 ozs. zinc sulphate to 5 gallons of water, and spray lightly.

" SLOW-SET " TROUBLES.

Cause.—Impure sand may cause plaster to set too slowly, especially if the sand contains organic matter. Water containing sulphur or considerable vegetable matter may also be responsible. The setting time of plaster is regulated by the addition of retarder at the mill. Localities in which the sand or water supply deviates from the standard, require plaster that is specially retarded.

How to detect.—When plaster fails to set after being on the walls for over four hours and shows tendencies to dry out near openings, it is " slow-setting ". The plaster is not necessarily defective ; the conditions may be due to improper mixing.

Before concluding that a plaster is " slow setting ", make this simple test. Mix dry, a sample of sanded plaster on a clean hawk or mortar-board. Put about a pint (two glasses full) of the mixture in the centre of the hawk or mortar-board. With the handle of a pointed trowel, make a hole in the centre of the dry-mixed material and work into a ring approx. 5 to 8 inches in diameter. Into this ring pour clean water, then fold plaster into water slowly and mix thoroughly. Place mixture on a well cleaned wet board, a piece of glass or bottom of an old plate. Take the time of set. Two hours is the average time for most sections of Australia and New Zealand. This time varies, however.

REMEDIES FOR " SLOW-SET "

Below are listed eight methods which may be used to make plaster set quicker. None will have any injurious effect on the plaster.

1. Use A.P.I. Accelerator, and add 4 to 6 ozs. (about a handful) to each sack of plaster.
2. Scrape mixing box vigorously with the hoe so as to incorporate with the mixture all the set plaster accumulated on the sides of the box. Mix plaster more thoroughly.
3. Crush some plaster droppings, screen through a fly screen, and use about a quart of this set plaster to each sack.
4. Add about a quart of hydrated lime to each sack.
5. Add about a quart of Portland cement to each sack.
6. Mix plaster with water in which tools have been washed.
7. Add alum to the mixing water in the following proportion, 1 pound of alum to 17 gallons of water.
8. Add zinc sulphate to the mixing water in the following proportion, 2 ozs. of zinc sulphate to 1 gallon of water.

Packed in 112 pound bags.

Covering capacity, approx. 25 yards.

MEMORANDA.

Portland Cement Stucco should be rendered and set, or *roughed* in and finished in two coats ; the second, or setting coat, can be added before the first coat dries, otherwise it must be scored deeply to form " key " for following coat. In every case the walls should be watered before the stucco is applied ; it is also necessary, if the cement is to become hard throughout, or properly set, that it be saturated with water daily, from 3 to 14 days, according to the heat of the weather, until there is no more suction, otherwise the cement stucco or plaster will merely have a hard surface, while the bulk remains a dry powder. Really good cements are often badly treated.

Porosity.—All exposed flat surfaces, or weatherings, should be set in 1 to 1 cement, the addition of sand makes it porous in proportion to the quantity used.

Plasterers' Putty for finishing coat of plaster work is lime dissolved in water, screened through hair sieve into boxes, allow to settle and sweeten 7 days.

Gauged Stuff is made by mixing before use 3 to 4 parts of the above Putty with 1 part of Plaster of Paris.

Trowelling the finishing surface should not be done too much as it causes fine cracks to appear when dry.

Setting Walls.—Most brick walls to be plastered are composed of callow and clinker bricks and this causes a variation in the "suction" of walls. For this reason it is advisable to use an Australian-made stainless steel trowel for this work to avoid as far as possible the darkening of the walls in patches.

It is found in practice that the stainless steel trowel is best.

To prevent Plaster of Paris setting too quickly add sprinkled sugar or add acetic acid.

The tints used for the setting coats are generally French grey, drab, buff or salmon.

Special cold water paints can be applied safely after 6 months' drying, when the mellowed plaster will not affect or alter the tint.

MEASUREMENT.

Measure walls and ceilings in square yards and include all openings.

Reduce piers to surface area in square yards; cornices, copings, bands, architraves, skirtings, etc. are estimated at per lineal foot according to width or girth.

Panels, mitres, returns, columns, caps and bases, balusters, dentil blocks, and patterns, &c., so much each, according to dimensions.

If circular, add one-fourth, if circular circular, as in domes or concentric arches, add one-half to each item.

Scaffolding to be charged extra, if erected expressly for the work.

GAUGES AND MIXES.

For practical purposes, the proportions given of "Gauges," "Mixes", etc., are by volume.

Where hydrated lime is used it must be mixed as lime putty first and measured as such. Lime putty is preferable to hydrated lime, and, where possible, many plasterers have a stock of lime putty at depot ready for use on jobs.

COVERING CAPACITY OF PLASTER.

"**Floating**" or first body coat of plaster, for internal walls only.

1¼ bags of stone lime, 1 cubic yard of sand will cover 50 super yards ½in. thick, or about 70 yards including general openings of cottages, or 1 bag lime and 1 load Sydney sand will cover 40 square yards ¾in. thick, or 60 square yards ½in. thick.

1 bag of stone lime run into **Putty** will "set" or finish coat 50 super yards.

One load sand mixed with ⅔ bag of lime will cover or "float" 40 square yards.

1 bag stone lime "putty" will cover 70 square yards of "setting" of interior walls.

Generally the mortar is reckoned at one-third stone lime and two-thirds clean sand.

ONE CUBIC YARD OF MIXED MATERIALS.

Will cover	36	square yards	1 inch thick say making cement coat to
	45	,, ,,	$\frac{7}{8}$ inch thick road
	54	,, ,,	$\frac{3}{4}$ inch thick
	62	,, ,,	$\frac{5}{8}$ inch thick, say "floating coat" plaster
	72	,, ,,	$\frac{1}{2}$ inch thick, say top coating bitumen or
	108	,, ,,	$\frac{3}{8}$ inch thick foot paving
	144	,, ,,	$\frac{1}{4}$ inch thick
	288	,, ,,	$\frac{1}{8}$ inch thick " setting " on finished coat
	576	,, ,,	$\frac{1}{16}$ inch thick, of white lime putty.

The smaller thickness for plasterer's coating, bitumen or surfaces, etc.
Allow for waste and adsorption in walls—say 10 per cent.
One bag cement (1 cu. ft.) gauged 6 to 1 covers 12 super yards of rendering.
One Cubic Yard sand $\frac{1}{2}$" thick covers 35 to 40 super yards.
One bag " Victor " hard finish plaster gauged 60–40 covers 50 sq. yds.
One bag " Victor " hard finish plaster gauged 50–50 covers 60 sq. yds.
One bag " Victor " hard finish plaster, next covers 25 sq. yds.

COST OF MATERIALS.

Lime (unslaked), 20/– per bag. Hydrated Lime, 6/– per 50 lb. bag. Cement, 8/4 per bag. Hardwall Plaster, 9/– per 80 lb. bag. Plaster of Paris, 7/6 per 80 lb. bag.

WALLS—INTERNAL.

" Floating " and " Setting "

Floating Coat.—Hydrated lime 1 ; cement 1 ; sand 6. The floating coat is hand floated, steel trowelled and finely scratched to take setting coat.

Setting Coat.—The setting coat is composed of lime putty and " Victor " hardfinish plaster. Minimum proportions 50–50 but 60 plaster to 40 lime makes a better job.

Where rounded angles abut on to jambs they must be cut away with trowel to free the jamb and so prevent cracking of plaster when doors are banged.

Example of Cost—Rendered and Set.

Walls.—Rendering and set—6/3 per super yard.
External and Rounded Angles.—10d per foot.
Skirtings.—2d per inch per foot—E.G. 6" Skirting, 1/– per foot.

Internal Walls—To take Wall-paper.

Gauge.—Lime putty 1 ; Cement 1 ; Sydney sand 6. The walls should be hand floated and steel trowel finish in one coat.

Rounded angles to doors, windows etc. to be finished over cement work after all woodwork is fixed in position.

Example of Cost.

Walls.—5/– super yd.—Rounded angles 9d per foot.

Internal Walls—Rendered.

Gauge.—1 lime putty ; 1 cement ; 6 sand.

Sandpaper Finish.—Render walls and finish with hand float.

Smooth Finish.—Render walls and finish with steel trowel.

Example of Cost.

Walls.—5/– super yard ; Angles 9d per foot ; Skirtings, 2d per inch-foot.

Internal Walls—White Cement Texture Finish.

Texture finish in white cement has the usual first coat of sand, lime and cement finely scratched. The finish must be trowelled with stainless steel trowel to avoid darkening of finished work.

Example of Cost.

Walls.—6/3 super yd. ; Angles, 1/– per foot ; Skirtings, 3d per inch-foot.

Tinting of walls to any colours mixed in the final coat add 6d per yard.

CEILINGS.

When a setting coat is required on ceilings in flats and multiple storey buildings, where cement floors are specified, the setting coat may be applied direct to the under side of floors, if the concrete has a good even surface. If the concrete is rough the ceiling must be rendered in cement to a smooth surface, before setting coat is applied.

Examples of Cost.

Ceilings.—Set direct on concrete, 3/6 per super yard.

Ceilings.—Rendered and set, 6/6 per super yard.

Cornices.—Plain, 3d. per inch per foot.

Allow scaffolding extra on costs.

EXTERNAL WORK—Examples of Cost.

External Walls—Include openings.

Cement Rendered.— 3 sand, 1 cement, ½″ thick, 5/– per super yard.

Window Sill.—Projecting Bands, etc., 3d. per inch girth per foot.

Steel Scaffold specially erected for job, 2/– per yard = 7/– super yard.

Piers—Cement Rendered.—Sizes to 18″ x 18″—7/6 per super yard.

Piers—Cement Rendered.—Larger sizes—7/– per super yard.

Lintels—Cement Rendered.—3d. per inch girth per foot.

Example.—Lintel 18″ x 12″ rendered 3 sides = 4′ x 2′ = 9d. per foot run.

Rendering steps 3ft. wide, 7/– per step = 2/4 per foot run.

For each additional storey—add 5d. per super yard extra.

Cement Rendering.—When 3 coats are required, 8/6 per super yard.

Circular and Radial work—add 50 per cent. on costs.

" Bagging " only in Cement.—2/3 per super yard.

CEMENT PATHS AND CAR TRACKS.

Examples of Costs.

Paths.—3 feet wide—3″ thick—including grounds fixing, 18/– per super yard.

Larger areas to floors, etc.—4″ thick—from 15/– to 25/– per super yard.

Car Tracks.—£1 5s. 0d. per super yard.

" COLORCRETE " TYROLEAN FINISH—COLOUR FINISH CEMENT.

The composition of " Colorcrete " Tyrolean Finish consists of 1 part " Snowcrete " (White Portland Cement), or 1 part " Colorcrete " (Coloured Portland Cement) mixed with 2 parts suitable sand (use only a washed white or very light coloured sand, silicious for preference, and constant in colour. The sand should all pass a No. 20 (B.S.S.) mesh sieve).

The dry materials should be thoroughly mixed together on a board and then mixed with water in a bucket or larger container, in the proportion of three parts cement and sand to approximately one part water **by volume.**

The mixture is then flicked on to the surfaces to be treated (such as—concrete block cavity walls or in-situ walls where joints or shutter marks may be outlined on the finished surface ; walls of brickwork, keyed concrete blocks, in-situ concrete which possesses adequate key such as " no-fines " concrete, et cetera) by means of a Tyrolean Finish machine.

The finish is built up in three layers to a total thickness of $\frac{1}{4}$ inch to $\frac{5}{16}$ inch (S.M.M.). The interval between each layer is dependent upon local conditions, but in warm or hot conditions it is virtually a continuous process.

Tyrolean Finish is an " open " textured finish which does not craze, and is uniform in colour, weather-proof, and does not readily absorb rain-water.

The covering capacity of Tyrolean Finish mixture is approximately 10 square yards per 1 cwt.

" Colorcrete " shades now available to Australia are :

Blue, Beige, Brown, Black, Burnt Sienna, Cream, (Dark, Light or Extra Light), Green, Light Green, Silver Grey, Pale Grey, Orange, Light Orange, Pink, Light Pink, Terra Cotta.

It is not recommended that Tyrolean Finish be applied direct to brickwork, nor to a render coat on brick containing harmful quantities of sulphates, unless all precautions are taken to prevent access of water to the bricks.

Tyrolean Finish has been successfully applied on a fairly wide scale in Australia since its introduction here.

For further information and service See Advertisement, Page 21.

SNOWCEM.

Decorative Waterproof Coating.

" Snowcem " is a decorative material for application to concrete, brick and similar surfaces. Having a natural afinity for these materials it produces a facing which becomes an integral part of the surface to which it is applied. In addition it is waterproof and thus provides a protective coating.

Colours.

In addition to White, Snowcem is supplied in three pastel shades, Cream, Pink and Silver Grey, and in four stronger colours, Yellow, Blue, Terra-cotta and Green. Any two or more colours may be mixed together to produce desired shades.

Mixing for Colours.—The mixing must be done whilst in powder form and **no other materials must be added.**

Ascertain by weight (not by volume) the proportion of the various colours in the mix to give the desired shade, and adhere strictly to these proportions to avoid variations in tints.

The mixing should be carried out in a colour mill if available. Alternatively, the weighed quantities should be mixed as well as possible with a trowel on a clean board, after which it must be sieved through a fine 20 mesh sieve. Repeat this operation until a trowel passed over the mixed powders, leaves no sign of streakiness or trace of separate colour.

It is then ready to mix with water in the usual manner.

Surfaces for which Snowcem is suitable.

Concrete ; Sand-lime bricks ; Bricks (NOTE—Bricks containing a harmful amount of sulphates are not suitable, except in the case of dry interior walls, such as cavity and partition walls) ; Stone (natural or cast) ; Fibro Cement Sheets ; Cement/Sand Renderings ; Cement/Lime/Sand Renderings ; Roughcast and Pebbledash ; Wall or Fibre Boards (other than those with excessive suction).

It should **not** be used on surfaces containing gypsum plasters.

Snowcem must be mixed in two stages—first to a paste, then to a liquid.

It can be applied by brush or spray. (When applied by brush the first coat should be well rubbed into the surface).

Snowcem should not be applied when there is risk of frost or, externally, during wet weather.

All absorbent surfaces should be saturated with clean water and the moisture allowed to dry off the surface before applying the first coat of Snowcem.

Covering Capacity.

This varies according to the porosity and the texture of the surface and whether applied by brush or spray. When mixed to normal consistency the approximate covering capacity per 1 cwt. of Snowcem for two coat work on different surfaces is as follows :—

	Square yards per cwt.
Brickwork :	
Hard, with no suction	240
Medium Hard	190
Soft and Porous	105
In-situ Concrete	195
Cement/Sand Rendering	180
Stone, varies according to suction ... (see brickwork above)	
Wall and Fibre Boards	260
Fibro Cement Sheets	275
Roughcast and Pebbledash	90

28 lb. drums	39/6 nett.
56 lb. drums	66/– nett.
112 lb. drums	132/– nett.

For further information and advice SEE ADVERTISEMENT, PAGE 21.

" BRICANION " LATHING.

" Bricanion " lathing consists of " roughened " terra-cotta nodules or crosses bonded, both horizontally and vertically, on to stout interlaced wire mesh. The result is an exceedingly strong flexible matting which, for ease of handling, is supplied in rolls containing 6 square yards. Each roll, approximately 10″ in diameter, consists of a section of lathing 16′ 3″ x 3′ 4″ wide and weighs 53 lbs. The " roughened " crosses have a natural cohesion to all kinds of rendering material and the interstices are designed to provide a key of exceptional strength, resulting in a complete mechanical bond.

It is vermin proof, incombustible and the many facets on the terra-cotta nodules assist in the dispersion of sound within the rendering material, giving it excellent sound insulating properties. " Bricanion " is easily cut to required lengths with garden shears. Joining is effected by breaking off rows of crosses with a hammer and twisting the projecting wires together.

" Bricanion " Matting may be fixed direct to ceiling joist or wall studs with spacings to 2 ft. centres. The fixing is done with ¾″ x ⅜″ staples and the plastering completed in the usual manner. Cow hair is unnecessary in the " pricking up " coat. Due to its special strength, Bricanion Matting is ideal for use in suspended ceilings without ceiling joists, and in partition walls without timber studding.

Suspended Ceilings.—Suspended ceilings may be required in the following cases and Bricanion lathing is ideal for these purposes :—

(1) beneath solid floors ;
(2) ceilings hung directly from roofs ;
(3) ceilings in house work without ceiling joists ;
(4) false ceilings in existing rooms for heating or accoustic purposes ;
(5) providing space for hidden services, etc.

In constructing suspended ceilings, 10 SWG suspension wires are attached to suspension points at 18″ centres and rows 3′ apart. Light rolled steel inverted V shaped sections, or alternatively, Mild Steel Rods of appropriate size are fixed to the suspension wires at 3 ft. centres. Light 6″ square mesh reinforcement is now wired to the underside of steel sections, allowing a few inches at each end for taking into brickwork or securing by suitable methods. The Bricanion Matting is wired to the underside of the reinforcement mesh. It is important to adjust the levels of the steel mesh reinforcement before finally fixing the Bricanion, to obtain a perfectly level ceiling when completed. Suspension wires from solid floors should be fixed in position before pouring concrete.

BRICANION 2″ SOLID PARTITION WALL WITHOUT TIMBER STUDDING.

This solid partition is formed by fixing a single curtain of lathing to a fixed ceiling member at the top and, where a narrow skirting is required, to a 3″ x 2″ or 2″ x 2″ sole plate. The side joints of the lathing overlap 2″ and are wired together with 20 SWG binding wire. The sole plate should be fixed to the curtain approximately 1½″ from the floor, and then the curtain is tensioned by nailing the sole plate to timber

floor, or to bolts embedded in a concrete floor. Reinforcement rods of ½″ x ⅜″ Channel section or ⅜″ mild steel rod, are fixed horizontally on one side of the lathing and vertically on the other side at 18″ centres and wired together through the lathing. The rods should not enter the ceiling, floor, or side walls of the partition. The partition is then plastered both sides and results in an extremely strong and rigid wall of 2″ thickness. Skirting or angle mould may be fixed at the bottom to break the joint.

CAVITY PARTITIONS.

Vertical rods of 1″ cold rolled steel V-shaped section or ⅜″ mild steel rods, are inserted at 18″ centres, in holes bored at the top and bottom in solid floors, or in a timber floor to a sole plate the finished thickness of the partition. Light 6″ square mesh is then fixed to the outside of the vertical rods with 20 SWG wire. Wooden distance blocks are inserted between the two skins to tie them together. The " Bricanion " is then hung vertically from the top, tensioned, and wired to the square mesh. The two faces are then plastered in the usual manner. Sound insulating filling may be used in the cavity if required.

Approximate Costs.

" **Bricanion** " **Lathing**—4/6 per square yard.

Labour Fixing—from 2/– per square yard, according to quantities, etc.

Quotes and advice on fixing details freely given on application to distributors. See Advertisement, Page 76.

" BB " EXPANDED METAL LATHING.

Expanded Metal Lathing is a diamond mesh lathing manufactured from 26 Gauge Metal and has an approximate weight of 2¼ lbs. per square yard. The mesh is ⅜″ shortway size and provides an excellent key for plaster and cement work of all kinds. Suitable for solid or hollow partitions, wall linings, ceilings, cement rendering external walls of timber framed construction, encasement of steelwork, etc.

A spacing of 12″ centres of fixing battens on bearers is recommended, but where the lathing can be sufficiently tensioned this may be increased several inches.

The lathing can be fixed quickly with flat headed nails and should always be fixed with the long way of the mesh spanning from support to support.

Size of sheets—9′ 0″ x 2′ 0″—price 9/6 per sheet.

For further information See Advertisement, Page 75.

FIBROUS PLASTER

The development of fibrous plaster technique to decorative ceilings, wall linings, joint free and applied ornament, cornices, etc., presents to the client, architect and builder unlimited scope for individual designs of beautiful interiors of buildings of all kinds.

Fibrous plaster is fire resistant, indestructible, light reflecting, unaffected by climatic conditions, vermin and rodent proof, and should damage occur it is easily repaired with plaster of paris, leaving no trace of damage.

It is manufactured, supplied and fixed by the manufacturer, who is responsible for the final result, thus removing responsibility from the architect or builder. This ensures a job of first class quality.

Light Reflection and Diffusion.

Fibrous plaster being pure white, is moulded into curves, predetermined by lighting engineers, fixed in suitable positions to ensure the even diffusion of light in factories, halls, offices and other buildings. These curves blend into adjacent surfaces invisibly.

For any further information required, contact should be made with the Fibrous Plaster Association of New South Wales. Names of the members of that Association will be given to Builders, Architects, and other home builders and literature will be forwarded on request.

See Advertisement, Page 29.

Nails : For Sheets use ... ... $1\frac{1}{8}$″ x 13 Galv. Flathead Nails
Small Cornices and cover mlds. $1\frac{1}{2}$″ x 15 ,, ,, ,,
Large Cornices ... ... 2″ x 13 ,, ,, ,,

CONTENTS OF GOOD QUALITY SHEETS.

Nominal Sheet Thickness	Weight of Plaster per sq. yard	Weight of Hemp Fibre per sq. yard.
$\frac{3}{8}$ in.	16 lbs.	11 oz.
$\frac{7}{16}$ in.	21 lbs.	14 oz.

COSTS.

Fibrous plaster work is usually fixed and finished by the Manufacturers, who supply battens and nails, etc.

They are also available in standard sheets on a supply only basis. Examples of both costs are shown.

EXAMPLES OF COST—MATERIALS AND LABOUR.

	Per Sq. Yard
Wall Sheets, $\frac{1}{2}$″—fixed to studs	6/5
Ceiling Sheets—Includes Battens and Plain Cornice... ...	10/8

Beam Casing, 14/- per sq. yard of surface covered.

EXAMPLES OF COST—SUPPLY ONLY.
Standard Sheets—Delivery 25 miles.

Wall Sheets $\frac{1}{2}$ inch—4/7 per super yard.
Ceiling Sheets, $\frac{3}{8}$ inch—3/6 per super yard.
Crating 9d. per sq. yard extra or cost.
Cornices—3″ to 6″—6d. per Lineal Foot.
Cornices—9″—9d. per Lineal Foot.
Crating—over 12″ Girth—12/6 per 100 Lineal Feet.
Increased Sizes add 1d. per inch per foot.
Cover Mould 2″—£1 10s. 0d. ; 3″—£2 0s. 0d. per 100 Ft. Run.
Crating—Add 10/- per 100 Lin. Feet.

BRICK VENEER HOMES

BRICK VENEER CONSTRUCTION.

Ideal for Australian Domestic Architecture.

Brick Veneer Construction combines the advantages of all timber and all brick construction, yet preserving the characteristic appearance of the brick house. Consisting of a fabricating timber framework, protected externally with a Brick Veneer wall 4½″ thick, it cannot be distinguished from an all brick house, yet it provides the following additional and important advantages.

Its internal appearance, especially when finished with streamlined, joint-free, Fibrous Plaster sheets, cannot be distinguished from a solid brick house as the Fibrous Plaster may be decorated to suit all tastes with sand, texture flat paint or kalsomine finishes.

Brick Veneer Homes are cool in summer and warm in winter, because their construction combines the advantages of both all brick and timber construction. Tests by the Commonwealth Experimental Building Station indicate that the addition of a two-inch thickness of insulation in the wall and on the ceiling of a Brick Veneer House make it the perfect house for Australian climatic conditions all the year through.

Fibrous Plaster is the obvious choice of discriminating owners to-day, because it can be invisibly jointed, thereby eliminating unsightly dust-collecting cover moulds, etc.

The Uniform Building By-Laws of Victoria and New South Wales Building Ordinances No. 70 and No. 71 permit the erection of Brick Veneer Construction anywhere in the State — even in previously defined all brick areas.

Maintenance of Brick Veneer homes is confined to painting external joinery and trim, as external walls are of brick or stucco.

Reliable reports from Architects and Builders indicate that the relative cost of Brick Veneer Construction for residential work compared to other types of construction is as follows :—

All Brick Construction	100 per cent.
Brick Veneer Construction	87-90 per cent.
Timber Construction	80 per cent.

For further information See Advertisement, Page 29.

METHOD OF CONSTRUCTION.

The timber framework is constructed first and the brick veneer wall is built around it and tied to the framework with wall ties. When sisalkraft building paper is used externally on wall studs, use 1¼″ hoop iron bent and turned down into frog of brick. Nail hoop iron on studs after the building paper has been fixed. Otherwise use No. 8 Galv.-iron wall ties with ends bent to form eyes and nailed each side of stud.

Footings :— Footings to be 18″ x 9″ reinforced concrete in faulty ground. Brick in cement footings, two courses 18″ and two courses 14″ brickwork may be used in suitable ground.

Foundation Walls must be built to allow 1½″ cavity between brickwork and studs.

Roof :—Pitch the roof on the timber frame and box in the eaves level with the bottom of overhang. This saves a few courses of brickwork and makes an excellent job.

Two Storey Work :—The studs must be continuous the full two storeys. The first floor joists are fixed on 6″ x 1″ bearers checked into studs internally. All other construction follows the usual building practice and complies with council regulations.

BRICK VENEER COSTS.

In estimating the cost of Brick veneer the only difference to other forms of construction lies in the external walls. Examples of this cost are shown below. All other costs are found under the various chapters in this book.

EXTERNAL WALLS—ONE STOREY WORK.

Example of Cost No. 1—Cost per Square.
4″ x 2″ Hardwood Studding.

	£	s.	d.
4″ x 2″ H.W. Studs—see "Carpenter"	5	18	0
500 O.K. Face Bricks—Laid at £26 10s. 0d.	13	5	0
Wall ties		2	6
Cost Per Square	19	5	6
Lined with Sisalkraft add		10	0
Cost with Sisalkraft	19	15	6
Fibrous Plaster internally, add	3	12	3
Nett cost per square	£23	7	9

Example No. 2—Cost Per Square.
4″ x 2″ Oregon Studs.

	£	s.	d.
4″ x 2″ Oregon Studs (see "Carpenter")	6	19	0
500 O.K. Face Bricks—Laid	13	5	0
Wall ties		2	6
Cost per square	20	6	6
Lined with Sisalkraft add		10	0
Cost with Sisalkraft	20	16	6
Add Fibrous Plaster internally	3	12	3
Nett cost per square	£24	8	9

Add profit and extra cartage.

TWO STOREY WORK.

Add Scaffolding, extra on Brickwork and Timber for Storey Work. Approximately £1 15s. 0d. per square.

For further information See Advertisement, Page 29.

PLUMBER

Measurements.

Lead work is usually charged by the lb. or cwt.

Close copper nailing and overlaps, soldering to joints, by the ft. run.

Water and Gas pipes by the ft. run.

Gas and Water fittings by the number of points of exit.

Galvanised Corrugated Iron Roofing and Ceilings by the square or 100 super ft.

In measuring eaves gutters, for every angle add the price of the angle separately.

Gal. Iron will last at least seven years without painting. If painted, non-poisonous paints should be used if the rain water is utilised for drinking purposes.

GALVANIZED CORRUGATED IRON.

Corrugated sheets are manufactured in 3 inch, 1 inch, and 5 inch corrugations.

The standard 3″ with a corrugation ¾″ deep is manufactured in two widths :—10–3″ corrugations and 8–3″ corrugations. Both are available in 16 gauge to 26 gauge and lengths 5 to 12 ft.

The standard 1″ corrugation is made in 26 gauge only, 25 corrugations wide and ¼″ deep. Used largely for linings, showers, ceilings, awnings and partitions.

The standard 5″ corrugation is available in 5–5″ corrugations of 1¼″ deep. Recommended for unsupported coverage where the maximum strength of the sheet as a beam is desirable.

STANDARD 8–3″ CORRUGATED SHEET.

APPROXIMATE WEIGHT PER SHEET—LBS.

Gauge	Length							
	5′	6′	7′	8′	9′	10′	11′	12′
18	26·18	31·36	36·54	41·73	46·91	52·09	57·27	62·45
20	21·21	25·41	29·60	33·80	38·00	42·20	46·40	50·59
22	17·18	20·58	23·98	27·38	30·78	34·18	37·58	40·98
24	13·89	16·64	19·39	22·14	24·89	27·64	30·39	33·14
26	9·37	11·23	13·08	14·94	16·79	18·64	20·49	22·36

SHEETS PER HALF-TON CASE.

18	43	36	31	27	24	22	20	18
20	53	45	38	34	30	27	25	23
22	66	55	48	42	37	33	30	28
24	84	70	60	52	47	42	38	35
26	120	100	85	75	66	60	54	50

AREA COVERED BY 1 TON OF SHEET—1½ CORRUGATIONS SIDE LAP, 6″ END LAP—SQ. FT.

18	767	778	787	793	798	802	805	808
20	946	961	971	979	985	990	994	997
22	1168	1186	1199	1209	1216	1222	1227	1231
24	1445	1467	1483	1495	1504	1511	1517	1522
26	2142	2174	2198	2215	2229	2241	2250	2256

COVERING CAPACITY OF 8″–3″ SHEETS—SIDEWAYS—SHEETWIDTH 2′1½″.

Lap ...	1	2	3	4	5	6	7	8
1½ corr.	1′–10½″	3′–9″	5′–7½″	7′–6″	9′–4½″	11′–3″	13′–1½″	15′–0″
1 ,,	2′–0″	4′–0″	6′–0″	8′–0″	10′–0″	12′–0″	14′–0″	16′–0″
2 ,,	1′–9″	3′–6″	5′–3″	7′–0″	8′–9″	10′–6″	12′–3″	14′–0″

STANDARD 10–3″ CORRUGATED SHEET. APPROXIMATE WEIGHT PER SHEET—LBS.

Gauge	Length							
	5′	6′	7′	8′	9′	10′	11′	12′
18	32·06	38·40	44·75	51·09	57·44	63·78	70·13	76·47
20	25·97	31·11	36·25	41·39	46·53	51·67	56·81	61·95
22	21·04	25·20	29·36	33·53	37·69	41·86	46·02	50·18
24	17·01	20·38	23·74	27·11	30·48	33·84	37·21	40·58
26	11·47	13·74	16·01	18·28	20·55	22·82	25·09	27·36

SHEETS PER HALF-TON CASE.

18	35	29	25	22	20	18	16	14
20	43	36	31	27	24	22	20	18
22	53	44	38	34	30	27	25	23
24	68	57	49	43	38	34	31	29
26	97	81	69	61	54	49	44	41

AREA COVERED BY 1 TON OF SHEET—1½ CORRUGATIONS SIDE LAP, 6″ END LAP—SQ. FT.

18	788	800	808	815	820	824	827	830
20	972	987	998	1006	1012	1017	1021	1024
22	1200	1219	1232	1242	1249	1255	1260	1265
24	1484	1507	1524	1536	1545	1553	1559	1564
26	2202	2235	2259	2277	2292	2303	2312	2320

NO. OF SHEETS AND WEIGHT—PER SQUARE. ROOFING.

Length of sheet	No. of sheets per 100 sq. ft.		Weight of sheets required per 100 sq. ft. of area in lbs.					
			8 x 3″ corr. sheet			10 x 3″ corr. sheet		
	8 x 3″	10 x 3″	22G	24G	26G	22G	24G	26G
1½ Corr. Side Lap—6″ End Lap.								
5′	11·43	9·02	196	159	107	190	153	103
6′	9·41	7·43	194	157	106	187	151	102
7′	8·00	6·32	192	155	105	185	150	101
8′	6·96	5·49	190	154	104	184	149	100
9′	6·15	4·86	189	153	103	183	148	100
10′	5·52	4·51	189	153	103	182	147	99
11′	5·00	3·95	188	152	102	182	147	99
12′	4·57	3·61	188	152	102	181	146	99
2 Corr. Side lap—6″ End Lap.								
5′	12·25	9·52	211	170	115	201	162	109
6′	10·08	7·84	208	168	113	198	160	108
7′	8·57	6·67	206	166	112	196	159	107
8′	7·45	5·80	204	165	111	194	157	106
9′	6·59	5·13	203	164	111	193	156	105
10′	5·91	4·60	202	163	110	193	156	105
11′	5·36	4·17	201	163	110	192	155	105
12′	4·90	3·81	201	162	110	191	155	104
2 Corr. Side Lap—9″ End Lap.								
5′	12·70	9·88	218	176	119	208	168	113
6′	10·39	8·08	214	173	117	204	165	111
7′	8·79	6·84	211	170	115	201	158	110
8′	7·62	5·92	209	169	114	199	160	108
9′	6·72	5·23	207	167	113	197	159	107
10′	6·01	4·68	205	166	112	196	158	107
11′	5·44	4·23	204	165	111	195	157	106
12′	4·97	3·86	204	165	111	194	157	106
SIDE WALLING AND VERTICAL SHEETING.								
1 Corr. Side Lap—4″ End Lap.								
5′	10·34	8·27	178	144	97	174	141	95
6′	8·57	6·86	176	143	96	173	140	94
7′	7·32	5·85	176	142	96	172	139	94
8′	6·38	5·11	175	141	95	171	139	93
9′	5·66	4·53	174	141	95	171	138	93
10′	5·09	4·07	174	140	95	170	138	93
11′	4·62	3·69	173	140	94	170	137	93
12′	4·23	3·38	173	140	94	170	137	92

COVERING CAPACITY OF 10–3″ SHEETS—SIDEWAYS.
WIDTH OF SHEET—2′–7½″

Lap	1	2	3	4	5	6	7	8
1½ corr.	2′–4½″	4′–9″	7′–1½″	9′–6″	11′–10½″	14′–3″	16′–7½″	19′–0″
1 ,,	2′–6″	5′–0″	7′–6″	10′–0″	12′–6″	15′–0″	17′–6″	20′–0″
2 ,,	2′–3″	4′–6″	6′–9″	9′–0″	11′–3″	13′–6″	15′–9″	18′–0″

ROOF TABLE FOR COMBINED SHEET LENGTHS.
24 Gauge and 26 Gauge—8 Corrugations.
Side Lap 1½ Corrugations—End Lap 6 inches.

Sheet Combinations	Rafter Length Covered	No. of sheets each length Per Square	Squares Per Ton 24G.	Squares Per Ton 26G.
6ft. and 5ft.	10′–6″	5½	15·0	21·0
7ft. ,, 6ft.	12′–6″	4¼	15·02	21·25
8ft. ,, 7ft.	14′–6″	3 11/16	15·04	21·4
9ft. ,, 8ft.	16′–6″	3¼	15·06	21·45
10ft. ,, 9ft.	18′–6″	2⅞	15·10	21·5
11ft. ,, 10ft.	20′–6″	2⅝	15·15	21·7
12ft. ,, 11ft.	22′–6″	2⅜	15·16	22·0

COST OF CORRUGATED IRON—STANDARD 8 CORRUGATIONS.
Per Ton—Per Sheet.

Length of sheet	Price Per Ton 24 Gauge	Price Per Sheet 24 Gauge	Price Per Ton 26 Gauge	Price Per Sheet 26 Gauge
	£ s. d.	s. d.	£ s. d.	s. d.
5 ft.	52 2 6	6 8	53 12 6	4 9
6 ft.	52 2 6	8 0	53 12 6	5 9
7 ft.	52 2 6	9 4	53 12 6	6 7
8 ft.	52 2 6	10 9	53 12 6	7 7
9 ft.	52 12 6	12 0	54 2 6	8 7
10 ft.	53 2 6	13 7	54 12 6	9 8
11 ft.	53 12 6	15 0	55 2 6	10 9
12 ft.	53 12 6	16 4	55 2 6	11 9

TANK MAKING SHEETS—24 GAUGE—PER TON.
5ft. to 8ft., £55 17s. 6d. ; 9ft., £56 7s. 6d. ; 10ft., £56 17s. 6d.

PER SHEET.
5ft., 7/2 ; 6ft., 8/7 ; 7ft., 10/- ; 8ft., 11/6 ; 9ft., 12/10 ; 10ft., 14/6.

CORRUGATED SHEET—22 GAUGE TO 18 GAUGE—PER TON
5ft. to 8ft., £52 12s. 6d. ; 9ft., £53 2s. 6d. ; 10ft., £53 12s. 6d. ; 11ft., 12ft., £54 2s. 6d.

GALVANISED CORRUGATED IRON ROOFING.

The costs include battens. Hips, ridges and valleys are costed separately at per foot run.

Example of Cost No. 1—Per Square Fixed.

24 Gauge Sheet—Spring Head Nail Fixing	£	s.	d.
24 Gauge Iron	3	14	0
Labour Fixing, 20/–; Nails, 1/6	1	1	6
3 x 1 Oregon Battens, 30 lin. ft. at 133/4		10	0
Fixing Battens		1	9
Nett Cost Per Square	£5	7	3

Cutting to hip roofs 4/– per square extra.
Screw and Washer Fixing 5/– per square extra.
Add cartage, oncosts and profit.

Example of Cost No. 2—Per Square Fixed.

26 Gauge Sheet—Spring Head Nail Fixing.	£	s.	d.
26 Gauge Iron	2	13	0
Nails, 1/6; Labour Fixing, 18/6	1	0	0
30 lin. ft. 3″ x 1″ battens, 10/–; Fixing, 1/9 ...		11	9
Nett Cost Per Square	£4	4	9

Cutting to hip roofs 3/– per square extra.
Screw and Washer Fixing 5/– per square extra.
Add Cartage, oncosts and profit.

GALVANISED IRON RIDGING IN 6 FT. AND 8 FT. LENGTHS

Example of Costs No. 3—Cost Per Foot Fixed.
26 Gauge Ridging—Laps Included.

Size	Material	Labour	Total
	s. d.	s. d.	s. d.
14″ ...	9	11	1 8
16″ ...	10	1 0	1 10
18″ ...	11	1 1	2 0

Example of Cost No. 4—Cost Per Foot Fixed.
24 Gauge Ridging—Laps Included.

Size	Material	Labour	Total
	s. d.	s. d.	s. d.
14″ ...	1 0	1 0	2 0
16″ ...	1 1	1 1	2 2
18″ ...	1 2	1 2	2 4

Allow oncosts and profit.

VALLEY GUTTER—COST PER FOOT FIXED.

24 gauge 18″ cost 1/2 ft., fixing 1/3, total cost 2/5 per foot.
Add extra for boards under valleys, 3/6 per foot.
Nett Cost per foot run, 5/11.

IMPORTED GALVANIZED IRON.

The use of imported galvanized iron has now become a regular part of Australia's economy, and the following information will be useful to the architect or contractor when estimating costs.

SOURCES OF SUPPLY :—

England.—Good quality ; specifications in line with Australian ; very little supply, particularly of 26 gauge ; slightly more ready supply 24 gauge and heavier gauges.
Sheet size : 8 x 3″ corrugations.

Belgium.—Material not quite up to Australian or British Standards; spelter 1·25 oz. per square foot ; Birmingham gauges sheet.
Sheets to the ton : 6′, 180 ; 7′, 155 ; 8′, 135.
Flat sheets from Belgium are 5 per cent. dearer than corrugated sheets. Generally, overseas materials can be taken at the time of writing to be 30 per cent. to 90 per cent. dearer than the local product.

Germany.—Same specifications as Belgian Sheet, but the price is usually 10 per cent. dearer.
Foot Note.—German currency is allied to the dollar and is regarded as a hard currency—supplies difficult.

Japan.—Japanese material is made to U.S. Standards in both gauge and specification. Spelter 1·25, normal export standard, but could be obtained in 1·5 and heavier. It must be remembered that the gauge is U.S. gauge which is heavier than Birmingham, so there are fewer sheets to the ton, and while the price per ton is approximately the same as that from Belgium and Germany, the value for money is not so good.

France.—French specifications are similar to Belgium and Germany. Supply is short, but should increase over the next 12 months. 24 gauge only is available in smaller quantities at the time of writing. Price 10 per cent. higher than Belgium. Corrugations—10 x 3″.

The foregoing countries are the main sources of supply. Any other source at present could be considered unreliable both from the position of supply and specifications.

All countries are able to supply normal sizes required usually charging extra for over 8′ lengths and extra for over 3′ widths, 3′ to be taken as a sheet in the flat.

For current prices and supplies See Advertisement, Pages 76 and 77.

SKYLIGHTS—SINGLE.

Glazed $\frac{3}{16}$″ mill rolled glass 42″ x 18″.

	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
Fixed :—	s. d.	s. d.	s. d.	s. d.	s. d.
26 Gauge	41 9	43 0	44 0	45 4	46 9
24 Gauge	44 3	46 0	47 9	49 9	51 6
To Open :—					
26 Gauge	62 0	62 9	64 0	65 3	66 9
24 Gauge	64 6	65 9	67 9	69 6	71 0

Glazed with wire cast glass, 3/6 extra.

Double skylights, each double above prices plus 14/–.

Louvred Skylights extra on above prices :—1 Louvre, 29/– ; 2 Louvres, 56/3 ; 3 Louvres, 80/6.

SMALL ONE INCH CORRUGATION SHEETS

Cost Per Sheet—Sheets Per Ton.

	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Gauge 26 ...	4 10	5 10	6 9	7 9	8 9	9 10
Sheets per ton	244	198	172	150	134	120

CEILINGS—SMALL CORRUGATED.

Example of Cost No. 5—Per Square Fixed.

Fixing to Ceiling Joists.	£	s.	d.
100 sq. ft. Iron with laps cost	2	13	6
Labour Fixing, 25/–; Nails, 1/6	1	6	6
Cost 7/3 per sq. yard. Nett Cost per square ...	£4	0	0

Add scaffolding, oncosts and profit.
For Walling, add Battens and Fixing, 13/– per square.

Curving Corrugated Iron—Per Sheet.

Small Dome Curving, 9d.; Bullnose Curving, 1/–; Half Circles, 1/3; Full Circles, 1/9.
Tiling Iron for Flat Roofs, 1/6 per sheet.

PLAIN GALVANISED FLAT SHEET IRON.

Weight Per Sheet—Sheets Per ½ Ton Case.

Gauge	Approximate Weight Per Sheet in lbs.				Sheets Per Half-ton Case			
	Width				Width			
	24″	30″	36″	48″	24″	30″	36″	48″
6 Feet Lengths.								
14	39·62	49·48	59·33	79·04	29	23	19	15
16	31·68	39·56	47·44	63·20	36	29	24	18
18	25·23	31·50	37·77	50·32	45	36	30	23
20	20·26	25·30	30·34	40·42	56	45	37	28
22	16·28	20·33	24·37	32·47	69	56	46	35
24	13·06	16·30	19·55	26·04	86	69	59	44
26	8·80	11·01	13·20	17·59	124	99	84	62
8 Feet Lengths.								
14	52·72	65·83	78·94	105·16	22	17	15	11
16	42·15	52·63	63·12	84·08	27	22	18	14
18	33·56	41·91	50·26	66·95	34	27	23	17
20	26·96	33·66	40·37	53·78	42	34	28	21
22	21·66	27·04	32·43	43·20	52	42	35	26
24	17·37	21·69	26·01	34·65	65	53	44	33
26	11·73	14·65	17·57	23·40	92	74	63	46

Cost Per Sheet.

Gauge.	24″ Wide 6′	24″ Wide 8′	30″ Wide. 6′	30″ Wide. 8′	36″ Wide 6′	36″ Wide 8′	48″ Wide. 6′	48″ Wide. 8′
26 ...	4/8	6/3	5/9	7/9	6/11	9/2	9/9	13/2
24 ...	6/4	8/6	7/11	10/9	9/7	12/8	13/6	18/3
22 ...	8/2	—	10/2	—	12/4	—	17/4	—
20 ...	10/2	—	12/8	—	15/1	—	21/6	—
18 ...	12/8	—	15/10	—	18/11	—	26/11	—
16 ...	15/10	—	20/5	—	23/11	—	33/9	—
14 ...	19/11	—	24/11	—	29/9	—	42/2	—

ROOF OR FLOOR—24 GAUGE FLAT SHEET.

Example of Cost No. 6—Per Square.

Laps and Waste Included.

	£	s.	d.
110 sq. ft. iron at 7d. sq. ft.	3	4	6
Labour Fixing, 20/–; Nails, 1/6	1	1	6
Cost 7/9 per sq. yard. Nett cost per square ...	£4	6	0

22 gauge allow £5 5s. 0d. per square.
20 gauge allow £6 5s. 0d. per square.
Flashing to be charged extra.

Roofing Nails and Screws.

70 Roofing Nails or 1 lb. required per square.
70 Roofing Screws and Washers required per square.
64 Lead Washers weigh 1 lb.—1/1 per lb.

QUADRANT GUTTERING—COST PER FOOT—FIXED.

Brackets and Laps Included in Cost.

Size	4″ s. d.	4½″ s. d.	5″ s. d.	6″ s. d.
26 Gauge	7	7	8	9
Labour Fixing	1 4	1 4	1 5	1 7
Nett Cost	1 11	1 11	2 1	2 4
24 Gauge	9	9	10	11
Labour Fixing	1 5	1 5	1 6	1 8
Nett Cost	2 2	2 2	2 4	2 7

For overstraps on gutters, 1d. per ft. run extra.
Gutter Angles: 26 Gauge, 3/3; 24 Gauge, 3/9 each.

Galvanised Rainwater Heads—Each.

26 Gauge. 2½″ s. d.	3″ s. d.	4″ s. d.	24 Gauge. 2½″ s. d.	3″ s. d.	4″ s. d.
12 6	13 9	16 0	15 0	16 0	16 6

GALVANIZED IRON DOWNPIPES.
Cost Fixed Including Bands—Per Foot Run.

Round	26 Gauge. Material	26 Gauge. Labour	26 Gauge. Nett Cost per foot	24 Gauge. Material	24 Gauge. Labour	24 Gauge. Nett Cost per foot
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2″ ...	6	1 0	1 6	7	1 1	1 8
2½″ ...	6	1 0	1 6	8	1 1	1 9
3″ ...	7	1 0	1 7	9	1 1	1 10
4″ ...	9	1 1	1 10	11	1 2	2 1
5″ ...	10	1 2	2 0	1 1	1 3	2 4
6″ ...	1 0	1 3	2 3	1 3	1 4	2 7
Rectangular						
3 x 2 ...	8	1 1	1 9	10	1 2	2 0
4 x 2 ...	9	1 1	1 10	11	1 2	2 1
4 x 3 ...	10	1 3	2 1	11	1 4	2 3
4 x 4 ...	11	1 4	2 3	1 2	1 5	2 7
6 x 4 ...	1 1	1 5	2 6	1 4	1 6	2 10

Shoes and Elbows (Downpipe)—Each.

	2″	2½″	3″	4″	6″	
26 Gauge ...	1/6	1/11	2/1	2/11	4/10	Each
24 Gauge ...	1/7	2/1	2/3	3/3	5/2	Each

ALUMINIUM GUTTER AND DOWNPIPE.

Aluminium alloy gutters are installed by slip joint method. The slips consist of narrow bands of aluminium, with a groove on each side, into which the lengths of guttering are pushed. The ends of the guttering may be painted with bituminous plastic before inserting in groove, thus forming a solderless, watertight joint. Aluminium alloy brackets, downpipes, stop ends, outlets and angles are all manufactured to make a complete job in aluminium. In no case should galvanized iron or other metal be used as a part of the guttering such as brackets, downpipes etc., as this sets up galvanic action, which causes corrosion at this point.

Measure gutters overall measurement and add stop ends, outlets and angles **extra at cost each.**

For supplies and information See Advertisement, Page 57.

Materials Cost—6 Foot Lengths—Per Length.

Gutter, 8/–; 2″ Downpipe, 6/3; 3″ Downpipe, 8/6; 4″ Downpipe, 11/–; 15″ x 22 Gauge Ridging, 12/–; 15″ x 24 G. Ridging, 9/6; 16″ x 22 G. Ridging, 12/6; 16 x 22 G. Valley, 12/9; 18″ x 22 G. Valley, 14/3; 18″ x 24 G. Valley, 10/6; Brackets, 6/8 per doz.; Over Straps, 6/– per doz.; External Angle, 7/3 each; Internal Angle, 8/9 each; Slip Joints, 1/1 each; Stop Ends, 2/– each; Gutter Outlets, 4/– each; 3″ Crimp Bends, 4/– each.

Example of Cost—100 ft. Run 4½″ Aluminium Gutter.

	£	s.	d.
17 Lengths Gutter at 9/– Length	7	13	0
16 Slips at 1/3 each	1	0	0
34 Brackets at 7d. each	1	0	0
Bitumen and Nails		2	0
Materials	9	15	0
Labour Fixing 100 ft. at 1/– foot	5	0	0
Cost = 3/– per foot. Cost, 100 feet	14	15	0

Allow Stop ends, Angles and Outlets extra at cost each.

Example of Cost—Downpipe 3″ Diameter.
100 ft. Run 3″ Diameter Downpipe.

	£	s.	d.
17 Lengths Downpipe at 7/3	6	4	0
Labour 100 ft. at 9d. foot	3	15	0
Plugs and Bitumen		1	0
Cost = 2/– per foot. Cost 100 ft.	£10	0	0

Aluminium Valleys:—16″, 13/–; 18″, 14/6 per 6 ft. length.

VENTILATION.

Galvanized Vent Pipes—Per Foot Run Fixed.
4″ x 18 Gauge, 2/-; Fixing, 2/-; Nett Cost, 4/- per foot.

Tall Boys—24 Gauge Iron—Each.

	£	s.	d.
9″ x 9″ Base—6 foot shaft—each	1	2	0
Revolving Cowls for tall boys—lobster back—each ...	1	18	0
Nett Cost Each	3	0	0
Labour:—Fixing Same	1	0	0
Nett Cost each, Fixed	4	0	0

Cowls—Each—Unfixed.

	2″	3″	4″	6″
	s. d.	s. d.	s. d.	s. d.
Sewer Vent Cowls (24G) ...	3 0	4 0	6 0	23 0
Down Draft Cowls	4 6	5 6	6 6	—
Baffler Cowls	—	10 6	12 6	—
Wire tops	—	1 6	2 0	—
Mica Flaps	—	—	4 3	10 9
H Cowls	5 0	6 0	6 0	—
Chinaman's Hats	1 9	2 4	2 6	4 9

Rainproof Cowls	6″	9″	10″	12″	15″	18″
with birdproof wire each ...	s. d. 23 6	s. d. 31 0	s. d. 34 6	s. d. 39 0	s. d. 57 6	s. d. 79 0

Allow Fixing, 5/– and profit.
Add for iron stays for above, 15/– per set approx.
Stumps Caps, 9½″ x 9½″, 26 Gauge, 9d.; 24 Gauge, 1/– each.
Aluminium Stump Caps, 1/3 each.

TANK MATERIALS.

Materials Supplied :—24 Gauge corrugated curved iron for sides, 24 Gauge plain iron for bottom, 26 Gauge plain iron for top ; rivets, washers, tap, socket and solder.

Add freight and Spirit of Salt. Add approx. 6% to prices.

Approx. Capacity	Dimensions Diam. Height	Approx. Weight cwt.	qrs.	lbs.	Materials only. £	s.	d.
50 Galls.	2′–2″ x 2′	0	1	10	1	0	9
100 ,, ...	3′–2″ x 2′	0	2	0	1	7	5
200 ,, ...	3′–2″ x 4′	0	3	0	2	1	1
300 ,, ...	3′–2″ x 6′	1	0	0	2	13	9
300 ,, (Squat)	3′–10″ x 4′	0	3	22	2	13	1
400 ,, ...	3′–8″ x 6′	1	1	0	3	3	7
400 ,, (Squat)	4′–6″ x 4′	1	0	22	3	10	0
500 ,, ...	4′–2″ x 6′	1	1	20	3	10	5
500 ,, (Squat)	5′–0″ x 4′	1	1	14	3	10	7
600 ,, ...	4′–6″ x 6′	1	2	2	3	14	8
600 ,, (Squat)	5′–3″ x 4′	1	1	24	3	14	0
800 ,, ...	5′–2″ x 6′	1	3	2	4	6	9
800 ,, (Squat)	6′–3″ x 4′	1	3	4	4	4	7
1,000 ,, (Computed) ...	5′–8″ x 6′	2	0	4	4	19	5
1,000 ,, (Full size) ...	5′–10″ x 6′	2	0	13	5	4	0
1,000 ,, (Squat)	7′–0″ x 4′	1	3	24	5	2	6
1,200 ,, ...	6′–4″ x 6′	2	1	6	5	11	0
1,500 ,, ...	7′–1″ x 6′	2	2	24	6	16	9
2,000 ,, ...	8′–2″ x 6′	3	1	13	8	7	4
3,000 ,, ...	10′–0″ x 6′	4	2	4	10	14	3
4,000 ,, ...	11′–6″ x 6′	5	2	14	13	5	9
5,000 ,, with 24 Gauge Top	13′–3″ x 6′	7	2	23	16	5	9
5,000 ,, No Top or Tap	13′–3″ x 6′	5	2	0	12	19	7
10,000 ,, No Top or Tap ...	18′–0″ x 6′	9	2	20	24	6	2
Extra for Ring	18′–0″ x 2′	1	2	4	3	4	1

Rivets, 1/5 lb. ; Washers, 1/6 lb.

GAUGE OF WALL SHEETS.

Maximum Diameters Allowable.

Height of Tank in ft.	Gauge 24	22	20	18	16	14
	ft.	ft.	ft.	ft.	ft.	ft.
4	30	38	48	60	75	90
6	20	25	32	40	50	60
8	15	18	24	30	36	42

CAPACITY OF CORRUGATED GALVANIZED IRON TANKS.

Wall Sheets of all one size for each Tank.

No. of sheets to the tank Perimeter	Capacity in Gallons.				
	8ft. sheets	9ft. sheets	10ft. sheets	11ft. sheets	12ft. sheets
4 Ft. or Two Rings.					
1	—	—	180	220	270
2	470	600	740	910	1,080
3	1,060	1,350	1,680	2,050	3,450
4	1,900	2,400	3,000	3,600	4,300
5	3,000	3,700	4,600	5,500	6,600
6	4,200	5,200	6,500	7,900	9,500
7	5,500	7,000	12,400	10,300	12,400
8	7,200	9,200	10,900	13,400	16,200
6 Ft. or Two Rings.					
4	2,800	3,600	4,500	5,300	6,300
5	4,400	5,400	6,700	8,200	9,900
6	6,100	7,800	9,700	11,300	13,600
7	8,200	10,000	12,500	15,400	18,600
8	10,000	13,000	16,400	20,100	24,300
9	12,700	16,500	20,800	25,500	30,700
10	15,700	20,400	25,600	31,500	37,900
11	19,100	24,700	31,000	38,100	45,900
12	22,700	29,400	36,900	45,400	54,600
8 Ft. or Three Rings.					
4	—	—	5,700	7,000	8,400
5	5,600	7,200	9,000	10,500	12,600
6	8,100	9,800	12,300	15,100	18,200
7	10,300	13,300	16,700	20,600	24,800
8	13,400	17,400	21,900	26,900	32,400
9	18,200	22,000	27,700	34,000	41,000
10	21,000	27,200	34,200	42,000	50,600
11	25,400	32,900	41,400	50,800	61,200
12	30,200	39,200	49,300	60,500	72,900

The above allows sheet end lap of—

4″ for tanks up to 5,000 gallons.
6″ for tanks from 5,000 gallons to 10,000 gallons.
9″ for tanks over 10,000 gallons.

MISCELLANEOUS DATA.

1 Cubic foot of distilled water at 62°F. weighs 62·321 lb.
1 Gallon of pure water contains 277·274 cubic inches.
1 Gallon of water weighs 10 lb.
1 Cubic foot of water weighs 62·5 lb.
1 Cubic foot = 6¼ gallons.
8 Gallons = 1 bushel. 1 Bag = 3 bushels.

CORRUGATED GALVANISED IRON TANKS IN COMMON USE.

Capacity of Tank Gallons	Height	Diameter	Walls 8/3″ Corrugations Orb Sheets			Bottom & Roof Widths of 6′ Sheets Q.H.	
			No.	Length	Gauge	Bottom 24G	Roof 26G
100	2′ 0″	3′ 2″	1	10′ 0″	24	1–24″	1–24″
200	4′ 0″	3′ 2″	2	10′ 0″	24	1–24″	1–24″
300	6′ 0″	3′ 2″	3	10′ 0″	24	1–24″	1–24″
300Squat	4′ 0″	4′ 0″	2	6′ 0″	24	1–36″	1–36″
			2	7′ 0″	24		
400	6′ 0″	3′ 8″	6	6′ 0″	24	1–36″	1–36″
400Squat	4′ 0″	4′ 4″	4	7′ 0″	24	1–36″	1–36″
500	6′ 0″	4′ 0″	3	6′ 0″	24	1–36″	1–36″
			3	7′ 0″	24		
500Squat	4′ 0″	4′ 11″	4	8′ 0″	24	2–30″	2–30″
600	6′ 0″	4′ 4″	6	7′ 0″	24	1–36″	1–36″
600Squat	4′ 0″	5′ 3″	2	8′ 0″	24	1–36″	1–36″
			2	9′ 0″	24	1–30″	1–30″
800	6′ 0″	5′ 0″	6	8′ 0″	24	1–36″	1–36″
					24	1–30″	1–30″
800Squat	4′ 0″	6′ 3″	4	10′ 0″	24	1–30″	1–30″
					24	2–24″	2–24″
1,000 Small	6′ 0″	5′ 7″	6	9′ 0″	24	2–36″	2–36″
1,000 Full	6′ 0″	5′ 11″	3	9′ 0″	24	2–36″	2–36″
			3	10′ 0″	24		
1,000Squat	4′ 0″	6′ 11″	4	11′ 0″	24	1–36″	1–36″
						2–30″	2–30″
1,000Squat	4′ 0″	7′ 4″	6	8′ 0″	24	3–36″	3–36″
1,200	6′ 0″	6′ 3″	6	10′ 0″	24	1–30″	1–30″
						2–24″	2–24″
1,500	6′ 0″	7′ 1″	3	7′ 0″	24	2–30″	2–30″
			6	8′ 0″	24	1–36″	1–36″
2,000	6′ 0″	8′ 3″	9	9′ 0″	24	3–36″	3–36″
						1–30″	1–30″
3,000	6′ 0″	10′ 0″	3	9′ 0″	24	6–36″	6–36″
			9	8′ 0″	24		
4,000	6′ 0″	11′ 6″	6	10′ 0″	24		
			6	9′ 0″	24	7–36″	7–36″
5,000	6′ 0″	13′ 0″	9	9′ 0″	24		
			6	8′ 0″	24	9–36″	9–36″
						36″ wide	*
10,000	6′ 0″	18′ 0″	18	10′ 0″	22	17-22G	
15,000	6′ 0″	22′ 6″	12	10′ 0″	22	26-22G	
			12	9′ 0″			
20,000	6′ 0″	25′ 6″	15	10′ 0″	22	32-22G	
				9′ 0″			
30,000	6′ 0″	32′ 6″	33	10′ 0″	20	50-20G	

* Above 2,000 gallons only 36″-wide sheets are considered.

As tanks of 10,000 gallons capacity and above are not usually provided with tops, no material is included in this data for same.

COPPER TANKS—16 Oz. (24 GAUGE).
Tanks Complete—Less Fittings.

Capacity.	Diam of Tank.	Height of Tank.	Tanks Complete £ s. d.
20 Galls.	1′–6″	2′–0″	3 5 6
30 ,,	1′–9″	2′–0″	4 2 4
40 ,,	2′–0″	2′–0″	4 8 2
50 ,,	2′–2″	2′–1″	5 9 7
60 ,,	2′–4″	2′–1″	5 16 5
70 ,,	2′–6″	2′–1″	6 5 4
80 ,,	2′–9″	2′–1″	7 8 4
90 ,,	3′–0″	2′–1″	7 19 7
100 ,,	3′–2″	2′–1″	8 13 5
150 ,,	2′–9″	4′–2″	10 19 1
200 ,,	3′–2″	4′–2″	12 13 7
250 ,,	3′–6″	4′–2″	15 0 6
300 ,,	4′–0″	4′–2″	17 5 1
350 ,,	4′–3″	4′–2″	18 15 0
400 ,,	4′–6″	4′–2″	20 13 4
450 ,,	4′–8″	4′–2″	21 15 3
500 ,,	4′–2″	6′–2″	22 16 7
600 ,,	4′–6″	6′–2″	25 18 3
700 ,,	4′–9″	6′–2″	27 17 11
800 ,,	5′–2″	6′–2″	30 4 3
900 ,,	5′–6″	6′–2″	32 18 3
1,000 ,,	6′–0″	6′–2′	34 14 4

ROOF WORK.
COPPER AND MUNTZ METAL.

Gutter, downpipe, ridging and valleys—Including brackets, Gutter (including brackets) 24G. 16 oz. Cost per foot fixed—Including Laps.

	4″	4½″	5″	6″
	s. d.	s. d.	s. d.	s. d.
Cost per foot	4 2	4 6	4 9	5 7
Fixing per foot ...	1 4	1 4	1 6	1 9
Nett cost per foot ...	5 8	5 10	6 3	7 4

If overstrapped add 6d. per foot.

ROUND COPPER DOWNPIPES—COST PER FOOT.
Including Laps and one Astragal per 6 Ft. Length.

	2″	2½″	3″	4″	5″	6″
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Cost per foot	3 4	3 10	4 5	5 6	6 9	8 2
Fixing per foot	1 2	1 2	1 2	1 3	1 4	1 5
Nett cost per foot ...	4 6	5 0	5 7	6 9	8 1	9 7
Astragals, each	1 7	1 8	1 9	1 11	2 1	2 11
Copper Crimped Bends, each	4 6	5 3	6 0	8 6	——	——

COPPER DOWNPIPES—RECTANGULAR—COST PER FOOT.

Including one strap per 6 ft. length.

	3″x2″	4″x2″	4″x3″	4″x4″	5″x4″	6″x4″
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Cost per foot	4 8	5 4	6 2	6 11	8 0	8 7
Fixing per foot	1 3	1 3	1 4	1 5	1 6	1 9
Nett cost per foot ...	5 11	6 7	7 6	8 4	9 6	10 4

COPPER RIDGE AND VALLEY—24G., 16 Oz.

Cost per foot fixed—Laps and Cutting included.

	12″	14″	15″	16″	18″	20″
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Cost per foot	4 9	5 4	5 11	6 4	7 0	7 9
Labour fixing ...	1 4	1 4	1 5	1 5	1 7	1 8
Nett cost per foot ...	6 1	6 8	7 4	7 9	8 7	9 5
Hardwood boards under valleys ...	1 6	1 10	2 0	2 5	2 9	3 1
Cost with boarding	7 7	8 6	9 4	10 2	11 4	12 6

5 in. HALF-ROUND CAST-IRON GUTTERING AND FITTINGS.—EACH.

Guttering, 6 ft. Lengths	11/11
Sockets or Spigot Stop Ends	1/2
Square Angles, right or left-hand	3/9
Obtuse Angles, right or left-hand	3/9
Tee Pieces	3/9
Nozzle Pieces with one or two sockets	4/4
Drop Ends, with Spigot or Socket	3/6
Union Clips	1/9
Cast Fascia Brackets	1/6
Wrought-iron Driving Brackets	1/9
Wrought-iron Hanging Brackets	1/2

Cost per foot, 2/6 ; Fixing, 1/6 = 4/– per foot fixed.
Add fittings extra from list prices above.

CAST IRON RAINWATER PIPES AND FITTINGS—EACH.

Glass Lined 50 Per Cent. Extra to List Prices.
If Coated with Anti-Rust Solution, Pipes, 6d. ; Fittings, 3d. each extra.

	2″	3″	4″	5″	6″
Rainwater Pipes					
2 ft. Lengths	9/3	10/5	13/1	18/–	21/9
3 ft. ,, ...	9/10	11/4	14/3	19/2	23/3
4 ft. ,, ...	10/2	11/11	15/8	20/4	25/–
6 ft. ,, ...	13/4	16/6	19/9	23/8	34/–
Rainwater Fittings.					
Bends or Elbows	3/9	6/1	9/10	13/1	16/10
Single Junctions	4/8	7/–	11/–	25/10	28/3
Single Junctions Unequal...	—	9/3	12/6	—	—

CAST IRON RAINWATER FITTINGS—EACH

	2″	3″	4″	5″	6″
Double Junctions ...	9/3	12/6	18/3	38/–	39/6
Double Junctions Unequal	—	12/6	18/3	—	—
Swan Necks or Offsets—					
1½″ Projection ...	5/10	6/1	11/4	—	—
3″ ,, ...	5/10	6/1	11/7	—	—
4½″ ,, ...	5/10	6/1	11/11	—	—
6″ ,, ...	5/10	6/5	11/11	24/1	24/5
9″ ,, ...	7/10	9/7	12/6	24/5	24/8
12″ ,, ...	8/5	9/10	13/4	29/–	30/–
15″ ,, ...	9/3	10/2	14/3	29/4	30/6
18″ ,, ...	11/4	13/1	18/7	30/–	30/9
21″	11/4	13/1	19/2	36/–	36/6
24″	11/7	14/3	19/9	36/6	37/6
Sockets	2/7	2/11	3/6	—	—
Reducing Sockets ...	—	5/10	6/5	—	—
Shoes	3/6	4/11	9/10	—	—
Loose Ears	4/11	4/11	5/10	—	—
Heads, Flat or Angle ...	9/3	9/10	10/2	—	—

Round—Cost Per Foot—Fixed.

	2″ 2″	3″ 3″	4″ 4″	5″ 5″	6″ 6″
C.I. Pipes (Round)	2/6	2/9	3/3	4/3	5/3
Labour fixing with putty ...	1/3	1/4	1/6	2/–	2/6
Nett Cost per foot (putty) ...	3/9	4/1	4/9	6/3	7/9
Add extra for lead joint ...	–/6	–/6	–/6	–/9	1/–
Nett cost per foot (lead) ...	4/3	4/7	5/3	7/–	8/9
If glass lined add	1/3	1/6	1/9	2/3	2/9
Nett cost glass lined	5/6	6/1	7/–	9/3	11/6

CAST IRON RAINWATER PIPES AND FITTINGS—EACH.

Glass Lined 50 per cent. extra to List Prices.

Square and Rectangular Pipes and Fittings.

	4″x3″	4″x4″	5″x4″	6″x4″
Pipes, 6 ft. Lengths ...	29/7	30/9	38/–	42/9
Shoes, side or front ...	17/5	17/5	17/5	17/11
Bends, side or front ...	17/11	17/11	18/3	19/2
Union Sockets	5/3	5/3	6/1	7/–
Clips or Loose Ears ...	5/3	5/3	5/10	5/10
Branches, single	18/3	21/2	22/8	24/4
Heads	44/5	46/3	47/10	49/3
Swan Necks or Offsets—				
3″ Projection ...	18/7	19/5	20/–	21/2
4½″ ,, ...	19/2	19/9	21/2	21/6
6″	21/6	22/4	22/11	24/4
9″	22/8	22/11	24/–	25/10

CAST IRON PIPES

Rectangular—Cost Per Foot—Fixed.

	4″x3″	4″x4″	5″x4″	6″x4″
C.I. Pipes (Rectangular) ...	4/6	4/6	5/6	6/3
Labour fixing (putty joints)	1/6	1/9	2/–	2/3
Nett cost per foot (putty joints)	6/–	6/3	7/6	8/6
Add extra for lead joints ...	–/6	–/6	–/9	1/–
Nett cost per foot (lead joints)...	6/6	6/9	8/3	9/6
Pipe glass lined add	2/3	2/3	2/9	3/–
Nett cost per foot (glass lined)...	8/9	9/–	11/–	12/6

WATER PIPES—HOUSE SERVICE.

Sydney W. & S. Board regulation, size of pipe permitted, ½ inch gal. iron water pipe for branch service supplying one shower-bath, one lavatory-basin, or one water-closet, urinal, or slop-sink cistern, where the branch pipe does not exceed 7 feet, and the service is directly connected to the Board's water main.

All other iron pipes used for water services shall not be less than ¾ inch internal dia.

Water Main to Meter.

The cost of connecting water from water main to meter is allowed for separately and comprises :—

Council fees ; Road opening Fee ; Meter ; Excavator and Plumber.

A sum of £15 is usually allowed for this work or £18 if the main is across the road.

WATER PIPE—GALVANISED—HOUSE SERVICE.

Example of Cost per foot, including tees, elbows, etc.

	½″		¾″		1″		1½″		2″		3″		6″	
	s	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Cost of Pipe ...		6		7		10	1	5	1	10	3	3	9	5
Labour cutting and threading ...	1	6	1	6	1	8	2	0	2	6	3	0	4	0
Nett cost per foot ...	2	0	2	1	2	6	3	5	4	4	6	3	13	5
Excavation 2′ deep in soil	1	0	1	0	1	0	1	0	1	0	1	0	1	2
Nett cost per foot with excavation	3	0	3	1	3	6	4	5	5	4	7	3	14	7

For excavation in soft sandstone add 2/– per foot.

Allow extra for ¾″ house service approximately 15/– per point of outlet for brass fittings on above prices.

Add cartage, oncost, profits, etc.

MALLEABLE PIPE FITTINGS—EACH.
GALVANIZED.

	½″	¾″	1″	2″	3″	6″
Socket Unions, Flat Faced ...	2/–	2/6	3/–	7/5½	25/10½	107/5½
Socket Unions, Brass Faced	3/8	4/4	5/2¼	12/11¾	—	—
Elbows	–/8¾	1/0¼	1/5¾	3/10½	13/11¼	93/6½
Elbows, M. & F. ...	–/10	1/2½	1/8	4/7½	15/11½	107/5½
Elbows, 3-way ...	1/6½	2/5½	3/2½	8/10¼	23/10½	—
Tees	–/10	1/2½	1/8	4/7½	15/11½	107/5½
Crosses	1/0¼	1/5¾	2/0¼	5/6¼	19/1½	129/4¼
Sockets, Plain and Beaded	–/5¼	–/7¼	–/9¼	2/1½	5/0½	26/4¾
Sockets, Reduced ...	–/6¼	–/8¼	–/11¼	2/6	7/8¼	36/9¾
Flanges	1/1¼	1/5¾	1/10¼	3/5	9/5	29/10¾
Oval Flanges ...	—	—	—	—	—	—
Caps	–/4½	–/6¾	2/5½	2/1½	5/11¾	—
Plugs	–/2¾	–/4½	–/6¼	1/3½	4/11½	—
Backnuts ...	–/3	–/4	–/4½	1/0¾	3/4½	17/11
Hexagon Nipples ...	–/6¼	–/8	–/10½	2/9¼	8/6¾	46/9
Hexagon, Nipples, Reduced	–/8½	1/–	1/2¾	3/10½	9/5¼	—
Bushes	–/4½	–/6¾	–/8¾	2/5	6/11¾	33/10
Bends, M. & F. ...	–/11¼	1/2½	1/10¼	6/5½	20/10½	129/4¼
Bends, F. & F. ...	–/11¼	1/4½	2/0¼	7/4½	22/10½	139/3½
Bends, M. & F., 45°	1/–	1/4	1/11¾	6/7¾	16/8½	105/5¾
Bends, F. & F., 45°	1/1¼	1/6½	2/2½	7/9	18/3¾	—

APPROXIMATE LABOUR COSTS—FIXING ONLY.

	£	s.	d.
Fixing Bath and Waste	1	10	0
,, Basin and Waste	1	10	0
,, Cement Tubs	1	0	0
,, Cistern and Brackets ...	1	0	0
,, Pedestal Pan (cement bed) ...	1	0	0

"BITULYND" WATER PIPES AND FITTINGS.

"Bitulynd" galvanised wrought iron pipes and fittings have an internal lining of bitumen, which greatly lengthens the life of the pipes by the prevention of internal corrosion. Approved by the Water Board for main to meter connections as an alternative to copper, and is recommended for longer life of full bore capacity and reduced maintenance costs. "Bitulynd" fittings must be used with "bitulynd" pipes to ensure the continuity of the bitumen lining.

"Bitulynd" Galvanized wrought Iron Pipe with Bitumen Lining.—Prices Nett

	½″	¾″	1″	1½″	2″	3″	6″
Price per ft.	–/9	–/11	1/3	2/2	2/10	5/1	11/6
Longscrews, 3″ to 11½″ ...	1/4	1/9	2/2	3/11	5/5	13/1	43/4½ ea.

" Bitulynd " Fittings—Cost Each—Add 41% Surcharge.

Backnuts ...	-/2	-/2¾	-/3	-/5½	-/11½	2/3	—
Bends, M. & F.	-/11	1/2½	1/10	4/4½	6/5	23/1	143/-
Bends, F. & F.	-/11	1/4½	2/-	4/11	7/4	25/4	154/-
Bends, M. & F., 45°	-/11¾	1/4½	1/11¾	5/2	6/7	18/5½	116/-
Bends, F. & F., 45°	1/1	1/6½	2/2½	5/11½	7/8½	20/3	—
Bushes ...	-/4½	-/6½	-/8¾	1/3½	2/4½	7/8½	37/6
Caps	-/4½	-/6½	-/8¾	1/4½	2/1½	6/7	—
Crosses ...	1/-	1/5½	2/-	3/4½	5/6	21/-	143/-
Elbows ...	-/9	1/-	1/5½	2/5½	3/10¼	15/5	103/-
Elbows, M. & F.	-/9¾	1/2½	1/7¾	2/10	4/7	17/7	118/-
Elbows, 3 Ways	1/6½	2/5	3/2	6/7	8/8½	26/5	—
Flanges ...	-/8¾	-/11½	1/2½	1/8¼	2/3	6/2	19/7
Hex. Nipples ...	-/6	-/8	-/10½	1/10	2/9	9/4½	52/-
Hex. Nipples, Reduced ...	-/8½	-/11¾	1/2½	2/7½	3/10	10/6	—
Plugs ...	-/2	-/3	-/4	-/7¼	-/10¼	3/3	—
Sockets ...	-/5¼	-/7¼	-/9¼	1/5	2/1½	4/5	23/-
Sockets, Reduced	-/6	-/8¼	-/11	1/7¾	2/5¾	8/4½	40/6
Tees	-/10	1/2½	1/7¾	2/10	4/7	17/7	118/-
Unions ...	2/3½	2/9	3/4	5/10	8/2	29/6	118/-

Supplied also in 1¼", 2½", 3½", 4" and 5" sizes.

" BITULYND " JOINTING COMPOUND—Plus 41%

For use on Threads, Ends of Pipes and Fittings before Screwing.

¼ pt.	½ pt.	1 pt.	1 qrt.	½ gal.	1 gal.
1/-	1/3	1/9	3/-	5/3	10/6

" BITULYND " ASBESTOS-BITUMEN PAINT—Plus 41%

For External Painting and Protection of Metal Pipes.

1 pt.	1 qrt.	½ gal.	1 gal.	4 gals.
1/9	3/-	5/6	10/6	35/6

Example of Cost—Per Foot—Not Including Fittings.

	½"	¾"	1"	1½"	2"	3"	6"
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Cost of Pipe ...	9	11	1 3	2 2	2 10	5 1	11 6
Labour Fitting only ...	1 6	1 6	1 8	2 0	2 6	3 0	4 0
Nett Cost ...	2 3	2 5	2 11	4 2	5 4	8 1	15 6

Add Fittings, excavation and profit, etc.

See Advertisement, Page 40a.

Imported Water and Gas Pipes.

During the last year there has been a great deal of imported water and gas piping used in Australia. This material is now obtainable from overseas from Holland and Germany, France and Belgium, and very

limited supplies from England. All these countries are familiar with British Standards, and are supplying pipe, both galvanised and black, suitable to Australian standards.

The most widely used standard in Australia is the British Standard Class B 1387. This is a type approved for use by most of the larger cities reticulation suppliers, but European Standard pipes are available, and are quite satisfactory for use by low pressure reticulation systems outside the Metropolitan areas, and for industrial uses such as the manufacture of gates, fences, etc.

The overseas British Standard pipes are priced at approximately 50 per cent. higher than the local articles, but they are readily obtainable from reputable importers.

For Supplies and quotes See Advertisement, Pages 76 and 77.

COPPER TUBES FOR MAINS CONNECTION.

Water Board Standard High-Pressure Service Sizes.

External Diameter inches	Gauge	Screwing Size	Weight lbs. per ft.	Approx. Price per ft. s. d.
$\frac{13}{16}$ ...	13	$\frac{1}{2}$″	·81	3 0
$1\frac{1}{32}$ ...	13	$\frac{3}{4}$″	1·05	3 9
$1\frac{9}{32}$ ...	12	1″	1·49	5 4
$1\frac{5}{8}$ ...	12	$1\frac{1}{4}$″	1·92	6 6
$1\frac{7}{8}$ ...	12	$1\frac{1}{2}$″	2·21	7 8
$2\frac{5}{16}$ ...	11	2″	3·09	10 9
$2\frac{13}{16}$ ...	11	$2\frac{1}{2}$″	3·97	13 9
$3\frac{15}{16}$ ...	10	3″	5·15	17 10

Add fittings, excavation, road opening fees.

COPPER PIPES FOR HOT OR COLD WATER SERVICES.

External Diameter inches.	Gauge	Screwing Size	Weight lbs. per ft.	Price per foot s. d.
$\frac{1}{2}$ ...	16	$\frac{1}{4}$″	·34	1 4
$\frac{5}{8}$ ...	14	$\frac{3}{8}$″	·53	2 0
$\frac{5}{8}$ ...	16	$\frac{3}{8}$″	·43	1 8
$\frac{13}{16}$ ...	14	$\frac{1}{2}$″	·71	2 7
$\frac{13}{16}$ ...	16	$\frac{1}{2}$″	·58	2 2
1 ...	16	$\frac{3}{4}$″	·72	2 8
$1\frac{1}{32}$ ...	14	$\frac{3}{4}$″	·92	3 4
$1\frac{1}{4}$ ...	14	1″	1·14	4 1
$1\frac{1}{4}$ ...	16	1″	·92	3 5
$1\frac{5}{8}$ ...	14	$1\frac{1}{4}$″	1·50	5 4
$1\frac{5}{8}$ ...	16	$1\frac{1}{4}$″	1·21	4 4
$1\frac{7}{8}$ ...	14	$1\frac{1}{2}$″	1·74	6 1
$1\frac{7}{8}$ ...	16	$1\frac{1}{2}$″	1·40	5 1
$2\frac{5}{16}$ ...	14	2″	2·16	7 7
$2\frac{1}{4}$ ...	16	2″	1·69	6 3
3 ...	14	$2\frac{1}{2}$″	2·83	10 6

Add Labour Costs as for Galvanized Pipe.

COPPER TUBES FOR COMPRESSION FITTINGS AND BRAZED JOINTS.

External Diameter inches	Gauge	Weight lbs. per ft.	Approx. Price per ft. s. d.
½	18	·26	1 1
⅝	18	·33	1 4
¾	18	·41	1 7
1	18	·55	2 2
1¼	18	·69	2 8
1½	14	1·38	4 11
1½	16	1·11	4 0
1½	18	·84	5 2
2	14	1·86	6 7
2	16	1·50	5 5
2	18	1·13	4 4
2¼	14	2·10	7 6
2¼	16	1·69	6 2
2½	14	2·35	8 4
2½	16	1·88	6 11
3	14	2·83	10 0
3	16	2·27	8 3

GAS PIPES—HOUSE SERVICE.

When laying gas pipes through floors the centre of joists should not be cut away, but all pipes should be laid near the ends of joists, so as not to weaken the floor joists.

Cost of fixing appliances shown separately.

GAS MAIN TO METER.

The cost of connecting gas from main to meter is generally allowed or separately and includes road opening fees, meter and plumber's costs and materials.

Where the main is on near side of road allow £15.

Where the main is on the far side of road allow £18.

Galvanized Iron pipes are compulsory for laying gas mains so the costs of galvanized water pipes may be taken to estimate the gas service mains.

LABOUR COSTS—FIXING ONLY APPLIANCES.

Bath Heater, £1 10s. 0d.; Gas Stove, £1 10s. 0d.; Gas Copper, £1 10s. 0d.; Water Heater, £1 10s. 0d.

Recipe to make Plumbers' Soil for keeping solder line on pipes when making them. **Soil,** for wiping joints, take ½ oz. pulverised glue, dissolve in water, gradually add a pint of lamp black with water to bring the whole to the consistency of cream. Boil and stir slowly.

Test.—Paint a little of the soil on pipe, if it comes off with a smart rub of the finger easily, add more glue till it sticks and takes a slight polish.

CAST IRON SOIL PIPES AND FITTINGS—EACH.
Glass Lined 50 per cent. extra to all prices.

Soil Pipes—Socket and Spigot—Each.

	2″	2½″	3″ (3/16″ Thick)	4″	5″ (¼″ Thick)
2 ft....	12/–	13/9	14/6	18/–	23/–
2 ft. with 1 door	28/9	31/3	32/3	35/–	55/3
3 ft....	13/3	15/–	16/–	18/–	26/9
3 ft. with 1 door ...	30/–	32/6	34/–	37/–	59/–
4 ft....	14/–	16/–	17/3	19/6	30/6
4 ft. with 1 door ...	30/9	34/–	35/–	39/–	62/9
6 ft....	19/3	22/9	24/3	28/–	40/–
6 ft. with 1 door ...	38/9	44/–	45/9	52/–	77/–
6 ft. Double Socket and Spigot	26/–	30/–	31/9	33/–	53/–
Bends or Elbows.					
Bends, Plain ...	8/–	8/3	12/–	13/6	19/6
Bends with Heel Rest	8/3	8/9	12/–	13/6	—
Bends with Air Vent	—	—	—	18/–	—
Inspection Doors on Bends ...	6/6	7/–	7/–	8/–	8/3
Branches or Junctions.					
Single	8/9	12/9	13/3	19/6	35/9
Single Unequal ...	—	12/9	13/6	18/6	35/–
Single Inverted ...	8/9	12/9	13/3	19/6	35/9
Single Inverted Unequal ...	—	12/9	13/6	18/6	35/–
Double	15/6	16/6	17/9	27/6	53/–
Double Unequal ...	—	16/6	17/–	26/6	52/–
Double Inverted ...	15/6	16/6	17/9	27/6	53/–
Double Inverted Unequal ...	—	16/6	17/–	26/6	52/–
Inspection Doors on Junctions ...	6/6	7/–	7/–	8/–	8/3
Swan Necks or Offsets.					
3″ Projection ...	8/–	8/9	12/3	17/–	18/6
4½″ ,, ...	8/3	8/9	12/9	17/6	19/–
6″ ,, ...	8/3	9/–	12/9	17/6	32/–
9″ ,, ...	11/6	12/3	13/–	18/–	32/6
12″ ,, ...	11/9	12/9	13/3	18/9	34/3
15″ ,, ...	15/–	16/–	17/–	19/3	34/9
18″ ,, ...	15/3	16/6	17/3	26/3	48/3
21″ ,, ...	15/6	16/9	18/–	26/9	49/–
24″ ,, ...	15/9	16/9	18/9	27/3	50/–

Sanitary Branches (For " P " Traps), 4 in. size only.

	6″	9″	12″	15″	18″	21″	24″
Projection ...							
3/16″ thick ...	28/3	32/–	32/6	32/9	33/3	34/–	34/6

Sanitary Branches (For " S " Traps), 4 in. size only.

3/16″ thick ...	—	32/3	33/3	34/–	41/6	42/6	43/9

Inspection doors to Sanitary Branches (3/16″ thick), 10/– each.

Short Connecting Pieces.

	9″	12″	15″	18″	21″	24″
4″ x $\frac{3}{16}$″	11/6	12/9	13/3	14/6	17/–	17/9

Sundry Soil Pipe Fittings—Each.

	3″	4″	5″
Syphon Trap, Plain	—	23/9	36/6
,, ,, with Inspection Door	—	29/6	44/6
Flat Pattern Double Junctions, 95 deg., to W. & S.D. Specifications ...	24/6	34/–	—
Flat pattern Double Junction with Inspection Door	30/9	40/6	—

	2″	$2\frac{1}{2}$″	3″	4″	$\frac{1}{4}$″ thick 5″
Double Sockets	3/9	4/–	4/3	5/3	11/3
Reducing Sockets	—	7/9	8/–	11/9	17/3
Shoes	4/1	4/7	5/6	10/7	—
Patent Slip Joints	22/6	23/6	24/9	28/3	50/3
,, ,, ,, with Inspection Door ...	31/6	32/9	34/3	39/3	75/–
Mica Flap Vents	—	—	—	10/–	—
No. 55 Soil Pipe Vents ...	—	—	10/–	12/–	—
Pipe Clips	—	—	—	5/6	—
Loose Ears	5/6	6/0	6/0	6/6	6/6

Inspection Door Cover, 12″ Square — 12/– each

COSTING SOIL PIPES.

Measure and cost as plain piping at per foot run adding as extras, bends, elbows, branches, junctions, swan necks, " P " traps, air vents, inspection and test doors, etc.

This work often entails working under difficult conditions, scaffolding, inaccessibility, etc., and care should be taken not to under price this class of work.

EXAMPLE OF COST—PER FOOT RUN—FIXED.

Under Favourable Working Conditions.

Diameter	2″		$2\frac{1}{2}$″		3″		4″		5″	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Cost of Pipes	4	6	5	0	5	6	6	0	9	0
Labour Fixing	2	0	2	3	2	6	3	0	4	0
Nett Cost Per Foot	6	6	7	3	8	0	9	0	13	0
Glass Lined Add	2	3	2	6	2	9	3	0	4	6
Nett Cost Glass Lined	8	9	9	9	10	9	12	0	17	6

Add fittings extra.

Add scaffold, oncosts and profit.

It will be seen that the price of pipes varies with the length. The above cost of pipes is an average cost only.

LEADWORK.

Sheet Lead—Per Ton.

	3lbs. to 8lbs.			2½lbs.			2lbs. per sq. ft.			
	£	s.	d.	£	s.	d.	£	s.	d.	
Full Rolls	90	3	3	91	0	9	91	18	3	per ton
Cut from Rolls	92	8	3	93	5	9	94	3	3	per ton
Circular Cuts	95	8	3	96	5	9	97	3	3	per ton

Lead work is usually at per pound, but in flashing and narrow strip work, it is often measured and priced at per foot run.

LEAD FLASHING—3 LBS. LEAD.

Step Flashing.
Raked, Wedged and Pointed, 5/- per foot run of Wall.
Straight Flashing.
Raked, Wedged and Pointed, 4/- per foot run of Wall.
Lead Floors—Lead, 10d. lb.; Labour, 9d. to 1/- per lb.

LEAD PIPE.

Lead Water Pipe—Weight Per Yard.
Diameter, ½″—2 lbs.; ¾″—3 lbs.; 1″—4 lbs.; 1¼″—5½ lbs.
Lead Waste Pipe—Weight Per Yard.
¾″—5½ lbs.; 1″—9 lbs.; 1¼″—13 lbs.; 1½″—15 lbs.; 2″—21 lbs.

LEAD PIPE—PER TON.

	⅜″ to 2″ Diam.		Up to 5″ Diam.
Coils	£94/18/3	Straight Lengths	£96/18/3
Cut Pieces ...	£96/18/3	Cut Pieces ...	£98/18/3

COMPO. PIPE.

	⅜″ Diam. and over	Under ⅜″ Diam.
Coils	£101/10/9 ton	£105/15/9 ton
Cut Pieces	£103/10/9 ton	£107/15/9 ton

FLUSH PIPES (LEAD) complete with Cap and Lining.

	5′–6″	6′	6′–6″	7′	
1¼	18/5	19/4	20/–	20/11	each
1½″	19/4	20/6	21/–	21/2	each

LEAD TRAPS—EACH.

S. Traps.

	Ordinary Length	6″ Extra.	9″ Extra.	12″ Extra.	18″ Extra.	24″ Extra.
1¼″ ...	6/5	8/2	9/–	9/9	12/1	14/2
1½″ ...	8/9	10/2	11/2	13/5	14/7	16/4
2″	11/–	13/11	15/–	16/–	19/5	20/11

Extra for Wiping Caps and Linings to Traps, 9/3 each.

P. Traps.

1¼″	5/8	7/6	8/6	9/4	10/11	13/–
1½″	6/10	8/7	9/9	10/10	12/6	14/5
2″	9/2	11/2	13/3	14/1	16/8	19/4

Extra for Wiping Caps and Linings to Traps, 9/3 each.

Pedestal Traps.

1¼″	14/8	16/4	17/5	18/1	20/6	22/6
1½″	18/7	20/2	21/4	22/4	24/8	26/7

Extra for Wiping Caps and Linings to Traps, 9/3 each.

Running Traps.

1¼″	1½″	2″	3″	4″
5/9	6/9	9/–	—	—

Extra for Wiping Caps and Linings to Traps, 9/3 each.

Bag Traps.

8/4	11/9	16/4	—	—

Extra for Extension Running or Bag Traps, 1¼″ and 1½″, 2/1; 2″, 2/7 for each 6 inches.

Lead Bends.

	1½″	2″	3″	4″
12″ x 12″	9/6	12/5	21/–	29/1
12″ x 18″	11/7	15/–	26/10	35/6
18″ x 18″	14/–	17/10	32/–	42/10

Washers (Lead).

28 lbs. and over, 106/9 cwt. Less than 28 lbs., 1/– lb.

METALS—PER POUND.

	s.	d.	
*Solder, 40T/60L	4	3	Per lb.
*Solder, 50T/50L	5	0	,,
*Solder, 60T/40L	5	9	,,
*Solder (Fine)	5	3	,,
Tin (Ingot)	8	1	,,
*Tin (Strip)	8	7	,,
*Wiping Metal	3	9	,,

Tin (Sheet and Pipe).

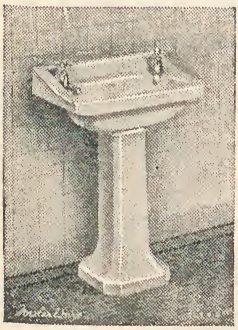
Block Tin Pipe, 9/7 lb.; *Sheet Tin, 10/6 lb.

SANITARY EARTHENWARE.

Fowler's Earthenware for bathroom, lavatory and kitchen. Potteries at Marrickville (N.S.W.), Thomaston (Vic.), Alderley (Qld), Mitcham (S.A.).

FOWLER'S PEDESTAL BASINS—WHITE AND COLOURED. APPROX. PRICES.

Without Chain Stay, Plug and Washer.



Plug and Washer, Cap and Lining:—
1½″, 10/6 each; 1¼″, 8/– each.

No.	White £	s.	d.	Coloured £	s.	d.
5116 22x16″ "Lynd" Flat Back ...	8	7	0	12	15	3
5078 24x20″ "Bellevue" Flat Back	11	3	3	15	10	6
5053 25x18″ "Marrick" Flat Back	9	17	3	14	10	6
5105 27x20″ "Cotter" Corner	10	4	0	15	6	0

FOWLER'S WALL BASINS—LAVATORY BASINS.

Without Chain Stay, Plug and Washer.

No.		£	s.	d.	£	s.	d.
5108	16x16″ "Bogan" Flat Back	2	11	3	3	17	0
5098	22x12½″ "Tambo" Flat Back	3	1	6	4	12	3
5114	22x16″ "Lynd" Flat Back	3	7	6	5	11	0
5068	25x18″ "Warrego" Flat Back	5	2	6	7	11	3
5076	25x18″ "Marrick" Flat Back	5	2	3	7	11	3
5079	24x20″ "Bellevue" Flat Back	6	8	6	8	11	3
5112	24½x13½″ "Yarra" Flat Back	3	10	3	5	5	6

FOWLER'S CORNER BASINS.

Without Chain Stay, Plug and Washer.

No.		£	s.	d.	£	s.	d.
5096	20x18″ "Tweed" Corner	3	8	3	4	4	6
5103	25x19″ "Clarence" Corner	3	17	0	7	0	0
5106	27x20″ "Cotter" Corner	5	9	0	8	3	6

FOWLER'S LOW LEVEL SUITES—LESS SEATS.

Including Galvanized Brackets.

No.		£	s.	d.	£	s.	d.
5369/70	"Marrick" Syphonic type, White ...	14	9	6	20	0	6
5356/5359	"Marrick" Wash Down Type ...	13	2	0	18	1	6
5373/5376	"Killara" Wash Down Type ...	13	14	3	18	1	6

FOWLER'S PEDESTAL PANS—S. OR P. TRAP.

No.		£	s.	d.	£	s.	d.
5280/5289	"Warren" S. or P. Trap	3	4	6	4	17	0
5264/67	"Kembla" Factory Type	5	10	0		—	
5586/5591	"Malvern" School Type	5	3	3		—	
5558/59	"Dulwich" P. Trap, R. or L. Skew...	5	8	0		—	

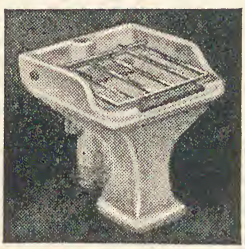
FOWLER'S SINKS AND SLOP HOPPERS.

KITCHEN SINKS—Without Plugs and Washers.

Plug and Washer, with cap and lining:—Brass, 9/6; Nickel Plated, 10/6.

	White			Coloured		
	£	s.	d.	£	s.	d.
18x15″ Overall with or without overflow ...	3	1	0	4	11	0
21x15″ ,, ,, ,, ,, ,, ,, ...	3	11	0	5	6	0
24x15″ ,, ,, ,, ,, ,, ,, ...	4	1	0	6	1	0

SLOP HOPPERS, ETC.—WITHOUT HINGED GRATE.



Slop Hoppers S. or P. Trap ...	15	18	0
21x16″ Cleaner Sink	9	10	0
12x12″ Laboratory Sink ...	2	10	0
14x14″ Laboratory Sink ...	3	15	0
Standing Wastes for Laboratory Sinks	1	4	0
Flat Back Wall Urinal ...	3	15	0
Corner Wall Urinal ...	4	13	0

CISTERNS—WITHOUT BRACKETS

	£	s.	d.
1 gal. Automatic Fitted ...	5	6	0
2 ,, ,, ,, ...	5	15	0
3 ,, ,, ,, ...	6	15	0
4 ,, ,, ,, ...	8	10	0

Wrought Iron Cistern Brackets, 3/– set.
Cast Iron Cantilever Brackets, 4/– per pair.

FOWLER'S ENAMELLED FIRECLAY WARE.
BELFAST SINKS—EACH.

	£	s.	d.
24 x 18 x 10″ Centre Back Outlet No. O/F. ...	7	7	0
27 x 18 x 10″ Centre Back Outlet No. O/F. ...	8	7	0
30 x 18 x 10″ Centre Back Outlet No. O/F. ...	9	10	0
36 x 18 x 10″ Centre Back Outlet No. O/F. ...	11	10	0
48 x 24 x 12″ Centre Back Outlet No. O/F. ...	24	0	0

BED PAN WASHERS.

	£	s.	d.
One Piece, Box Flushing Rim (no fittings), P. Trap	30	0	0
One piece, Box Flushing Rim (no fittings), S. Trap	30	10	0

Add plugs, washers and Brackets or frames.

FOWLER'S ENAMELLED FIRECLAY URINAL STALLS—EACH.
With or Without Treads—No Fittings.

Stalls Only, Individual Outlet Type.	£	s.	d.
3′–9″ x 1′–10½″ Single or one Person Stall	25	10	0
3′–9″ x 4′–0″ Double or two Persons Stall Range with Divisions	57	0	0
3′–9″ x 2′–0″ Each additional Stall with Division ...	31	15	0

Urinal Grates :—Brass, 22/– ; Chrome or Nickel Plated, 25/–.

CISTERNS—WHITE EARTHENWARE, AUTOMATIC—URINALS

	£	s.	d.	
1 Person (1-gall.)	5	7	6	each
2 Persons (2-gall.)	5	15	0	each
3 Persons (3-gall.)	6	15	0	each
4 Persons (4-gall.)	8	10	0	each
5 Persons (1 3-gall., 1 2-gall.)	12	10	0	pair
6 Persons (2 3-gall.)	13	10	0	pair

CONCRETE CISTERNS

	£	s.	d.	
Concrete Cisterns	2	0	0	each
,, ,, Multiflush	3	2	0	each
,, ,, Automatic	3	0	0	each
,, Grease Traps (House)	1	18	0	each

SPARGE PIPES AND SPREADERS, CHROME-PLATED, EXPOSED AND RECESSED PATTERN.

	For Individual Outlet Type. £ s. d.
1 Person	2 10 0 each
2 Persons	5 0 0 each
3 Persons	6 6 0 each
4 Persons	9 7 0 each
5 Persons (1 of 2 and 1 of 3 Persons)	11 10 0 each
6 Persons (2 or 3 Persons)	12 15 0 each

Note.—Fittings for Ranges of more than 6 Persons double the price of fittings used for half the range

See Advertisement, Page 12.

CAST IRON PORCELAIN ENAMEL BATHS—FLANGED.

White—	Porcelain Enamel £ s. d.	Stainless and Acid Resisting £ s. d.	Stock Colours £ s. d.
1st Quality 5ft. and 5′–6″ ...	14 10 0	16 4 0	17 5 0
2nd Quality 5ft. and 5′–6″ ...	13 15 0	15 8 0	16 8 0

CAST IRON PORCELAIN ENAMEL BASINS—ALL PRICES INCLUDE PLUG AND WASHER.

Basins (Angle) 25″ x 20″.

White—	Porcelain Enamel £ s. d.	Stainless and Acid Resisting £ s. d.	Stock Colours £ s. d.
1st Quality	2 19 0	3 3 0	3 7 3
2nd Quality	2 16 0	3 0 0	3 4 0

Basins (Flat Back), 22″ x 16″.

White—	Porcelain Enamel	Stainless and Acid Resisting	Stock Colours
	£ s. d.	£ s. d.	£ s. d.
1st Quality	3 4 3	3 9 3	3 15 0
2nd Quality	3 1 3	3 6 0	3 11 0

Basins (Round).

White—	Stainless and Acid Resisting 14″ £ s. d.	16″ £ s. d.
1st Quality	2 10 3	2 12 3
2nd Quality	2 8 0	2 10 0

Brackets and Frames, 10/– per set.
Combination Towel Rail Brackets, 25/– per pair.

Basins (Pedestal): "Canberra," "Oxford" and "Kent."

	Stainless and Acid Resisting White £ s. d.	Stock Colours £ s. d.
1st Quality	11 14 0	12 8 0
2nd Quality	11 2 0	11 16 0

Basins (Pedestal): "Gloucester" and "Grafton."

	Stainless and Acid Resisting White	Stainless and Acid Resisting Stock Colours
	£ s. d.	£ s. d.
1st Quality	11 15 0	12 10 0
2nd Quality	11 3 0	11 17 0

Basins (Wall): "Ainslie," "York" and "Surrey."

	Stainless and Acid Resisting White	Stainless and Acid Resisting Stock Colours
	£ s. d.	£ s. d.
1st Quality	6 10 0	6 17 0
2nd Quality	6 3 0	6 10 3

*Cast-iron Cantilever or Screwing Brackets, 7/6 pair extra.

Basin (Wall): "Devon" (22" x 12").

	Stainless and Acid Resisting White	Stainless and Acid Resisting Stock Colours
	£ s. d.	£ s. d.
1st Quality	3 19 0	4 5 0
2nd Quality	3 15 0	4 1 0

CAST IRON PORCELAIN ENAMEL SINKS.

Sinks (without Overflow)—White.

	18"	24"	30"
Porcelain Enamel (1st Quality) ...	46/–		
Porcelain Enamel (2nd Quality) ...	44/–		
Stainless and Acid Resisting (1st Quality)	50/–	57/–	74/–
Stainless and Acid Resisting (2nd Quality)	48/–	54/6	70/–

Combination Sinks and Drainers.—Stainless and Acid Resisting Enamel only.

	First Quality White	First Quality Stock Colours	Second Quality White	Second Quality Stock Colours
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
No. 60, 4ft. long	8 1 0	8 15 0	7 13 0	8 6 0
No. 607, 4ft. 6 in. long ...	8 17 0	9 10 6	8 8 0	9 1 0
No. 61, 5ft. long	9 9 0	10 1 6	8 19 0	9 12 0

CONCRETE TUBS—EACH.

	s. d.
One Compartment	37 6
Two Compartment	69 0
Two Compartment, Double Outlet	72 0
Two Compartment, Wringer-proof	75 0
Three Compartment	93 0
Three Compartment, Wringer-proof	105 0

Pedestals for tubs, 20/– per pair

CRATING CHARGES.

	s. d.		s. d.	
1 Cpt. Tub	6 0	set		Not returnable.
2 Cpt. Tub	13 6	set	7/6	Allowance on return.
3 Cpt. Tub	20 0	set	10/9	Allowance on return.
Grease Traps	6 0	each		Not returnable.
Cisterns	4 0	each	1/6	Allowance on return.
Special 2 piece 2 Cpt. Crate	12 0	set	5/0	Allowance on return.
Tub Pedestals	6 0	pair	2/0	Allowance on return.

HIGH PRESSURE TESTED BRASSWARE—EACH PLUS 24¾ PER CENT SURCHARGE

Bib Cocks	½″	¾″x⅝″	¾″F.W.	1″	1¼″	1½″	2″
T.H. Polished	7/4	7/6	9/5	14/10	42/7	60/9	70/11
T.H. Chrome or Nickel P....	8/3	8/8	10/6	16/6	—	—	—
S.H. Polished ...	10/1	10/7	11/1	16/–	—	—	—
S.H. Chrome or Nickel P....	11/3	11/9	12/2	17/9	—	—	—
E.C. Chrome or Nickel P....	12/11	14/5	—	—	—	—	—
Glenfield (Press Button) ...	28/10	33/–	—	—	—	—	—
Asylum Pattern, with Key...	—	—	32/4	37/5	—	—	—
Asylum Pattern, without Key	—	—	30/2	35/3	—	—	—

Ball Cocks (Croydon Pattern)	½″	¾″	1″	1¼″	1½″	2″
H.P. Complete ...	11/3	21/11	26/9	58/6	70/3	108/10
H.P. Less Ball ...	7/3	14/6	17/3	46/6	54/9	70/5
L.P. Complete ...	13/11	24/4	31/2	59/3	76/–	—
L.P. Less Ball ...	10/1	16/10	21/10	45/3	58/8	—
Levers only ...	3/9	5/1	6/7	—	—	—

Ball Cocks (Silent).	½″	¾″
H.P. Complete	11/3	27/8
H.P. Less Ball	7/3	20/2

Ball Cocks (Lambert Pattern).	1¼″	1½″	2″	2½″	3″	4″
H.P. or L.P. Complete	73/4	83/1	102/11	154/5	193/6	280/7
H.P. or L.P. Less Ball	47/9	57/1	72/2	116/5	140/8	232/9

Cistern Cocks (Straight Union).	½″	¾″x½″
Rough	10/3	10/10
Polished	12/7	13/1
Chrome or Nickel P.	14/–	14/7

Cistern Cocks (Elbow Union).		
Rough	10/10	11/6
Polished	12/10	13/7
Chrome or Nickel P.	14/8	15/–

HIGH PRESSURE BRASSWARE—24¾% SURCHARGE

Hose Cocks.

	½″	¾″x⅝″	¾″F.W.	1″	1¼″	1½″	2″
Polished Bare ...	7/6	8/7	11/6	16/6	60/6	76/10	92/8
Chrome or Nickel P. Bare ...	8/9	9/10	12/4	18/2	—	—	—
Inverted Bare ...	—	11/5	—	—	—	—	—
Asylum Pattern, with Key ...	—	—	33/3	39/5	—	—	—
Asylum Pattern, without Key	—	—	31/4	37/7	—	—	—

Main Cocks and Elbows.

	¾″	¾″x1″	1″	1″x1¼″	1″x1½″
Complete	19/11	20/9	25/–	29/2	33/–
Elbows only	6/7	7/1	8/9	12/11	17/–
Main Cocks only ...	13/9	—	16/2	—	—

Meter Cocks or M. and F. Shower Cocks.

½″	¾″	1″x¾″	1″	1¼″	1½″
7/2	9/3	10/5	13/9	38/5	54/9

Path Cocks.

¾″	1″x¾″	1″	1¼″	1½″	2″	2½″	3″	4″
13/1	14/5	15/9	30/1	38/2	64/7	129/1	168/10	223/8

Pillar Cocks.

	½″ (Bare)	½″ (With C. & L.)	½″ (With Toilet Union)	¾″ (Bare)	¾″ (With C. & L.)
S.H. Polished ...	10/2	11/3	12/3	33/1	34/9
S.H. Chrome or Nickel P. ...	11/2	12/2	13/3	34/10	36/7
E.C. Chrome or Nickel P. ...	13/2	14/3.	15/2	—	—

Shower Cocks

	½″	¾″	1″	1¼″	1½″	2″
T.H. Rough ...	6/10	9/2	13/4	34/10	41/9	73/9
T.H. Polished ...	7/9	10/3	15/1	39/10	48/11	79/11
T.H. Chrome or Nickel P. ...	8/10	11/4	17/–	—	—	—
S.H. Polished ...	10/–	11/11	—	—	—	—
S.H. Chrome or Nickel P. ...	11/2	13/8	—	—	—	—
E.C. Chrome or Nickel P. ...	12/8	26/7	—	—	—	—
E.C. Recess-Chrome or Nickel P. ...	13/8	—	—	—	—	—
Asylum Pattern, with Key	—	33/3	37/4	—	—	—
Asylum Pattern, without Key ...	—	31/4	35/4	—	—	—
Glenfield (Press Button)	28/5	33/1	—	—	—	—

BRASS TESTED FITTINGS FOR WATER MAIN CONNECTIONS.

Plus 24¾ per cent. Surcharge.

Adaptors.

	⅜″	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
Brass	1/8	1/8	1/9	2/4	3/6	5/–	7/1	16/1	20/10
Chrome or P. Nickel	2/2½	2/2½	2/2½	2/10½	—	—	—	—	—

	¾″x½″	1″x¾″	1¼″x1″	1½″x1¼″	2″x1½″
Brass	2/1	2/4	4/10	7/2	10/8
Chrome or Nickel P.	2/8	2/10	—	—	—

Bends M. and F. and Female.

	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
Rough ...	3/–	3/2	4/10½	7/8	13/7	17/7	39/9	88/4
Chrome or Nickel P.	3/11	4/–	6/–	—	—	—	—	—

Sockets

	⅜″	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
Rough	1/8	1/10	2/–	2/10	4/9	6/4	8/2	13/2	15/7
Chrome or Nickel P.	2/5	2/8	2/10	3/11	—	—	—	—	—

Unions.

	⅜″	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
Female ...	4/11	5/4	7/10	10/7	14/–	20/2	25/9	53/8	75/10
M. and F. ...	6/2	6/7	9/2	12/2	16/–	23/8	31/11	61/4	83/5
T. and S. ...	—	5/5	7/1	11/9	—	—	—	—	—

BRASS FITTINGS FOR HOT OR COLD WATER SERVICES—

Plus 24¾ per cent. Surcharge.

Breeching Pieces (Shower).

	Rough	Polished	Chrome or Nickel P.
⅜ inch	7/2	8/–	8/11
½ inch	7/2	8/–	8/11
¾ inch	12/7	13/5	15/–

Caps and Linings (Long Tail Heavy).

½″	¾″	1″	1¼″	1½″	2″
1/9	2/4	3/3	3/10	5/1	6/9

***Cylinder Bosses (B.M.)**

	½″	¾″	1″	1¼″	1½″	2″
Ordinary	2/8	2/11	3/4	4/–	4/10	7/8
Govt. Pattern	5/7	7/6	8/3	9/8	11/6	17/2

Elbows.

	¼″	⅜″	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
Female ...	1/–	1/–	1/6	1/11	3/–	5/6	6/5	9/–	23/–	35/3
Reducing or M. and F. ...	1/2	1/3	1/8	2/1	3/6	6/4	8/10	12/1	26/9	37/7

Nipples (Plain).

	⅛″	¼″	⅜″	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
Ordinary	3d.	3d.	5d.	8d.	1/–	1/5	1/11	3/2	3/9	9/5	11/2
4 ins long	—	—	—	4/11	6/4	8/3	11/6	13/10	15/2	—	—
6 ins long	—	—	—	6/5	8/4	10/11	15/2	17/4	20/4	—	—

Nipples (Hexagon).

⅛″	¼″	⅜″	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
5d.	7d.	8d.	10d.	1/0½	1/10	2/10	3/4	4/11	11/3	14/10

BRASS FITTINGS—24¾% SURCHARGE

Plugs.

— 1/– 1/3 1/5 1/8 1/11 2/11 3/11 5/4 11/10 13/1

Sockets.

— 10d. 1/– 1/2 1/3 2/5 4/5 5/11 7/10 12/9 15/5

Sockets (Reducing).

— 1/1 1/6 1/6 1/10 3/5 — — — — —

Tees

— 1/– 1/– 1/7½ 2/4 3/6 6/2 7/11 11/– 37/1 42/6

Unions (Hot Water).

Light (Brass)

1/5 1/6 1/11 2/6 3/8 4/11 7/10 10/7 15/7 47/10 71/10

No. 532 (Gun Metal).

— 2/5 2/6 3/2 4/4 5/11 9/5 11/10 18/4 50/7 73/8

Unions (Steam).

No. 532 (Gun Metal)

— 3/4 3/4 3/8 5/6 7/6 11/1 14/2 23/2 52/2 75/10

Unions G.M. (Govt. Standard).

Female.

¼″x6oz.	⅜″x7oz.	½″x½lb.	¾″x¾lb.	1″x1¼lb.	1¼″x2lb.	1½″x2½lb.	2″x5½lb.
4/11	5/1	6/7	9/–	10/11	14/7	21/3	31/1

M. & F.

5/8	5/11	7/11	10/2	12/6	16/4	24/9	36/11

BRASS SEWERAGE FITTINGS—Plus 24¾ per cent. Surcharge.

Caps and Linings.

	1¼″	1½″	2″	2½″	3″
For Lead	1/10	2/2	2/11	12/11	17/8
Male End	3/5	3/9	4/8	17/–	24/4
Female	4/4	4/9	5/7	—	—

Elbows.

	1¼″	1½″	2″	2½″	3″
Plain	2/11	4/4	5/3	14/4	18/6
With I.O.	4/5	5/6	7/–	17/5	20/9

Extension Pieces.—Each.

	3″	4″	6″	9″	12″
1¼″	5/11	6/10	8/3	9/7	12/7
1½″	6/7	7/1	8/9	10/3	13/1
2″	8/10	9/7	10/5	12/1	15/1

Ferrules (Sewer)—Each.

	2″	2½″	3″	4″
For Lead and C.I. Soilpipes	5/6	8/2	9/9	12/2

Floor Wastes.—Each.

	Brass	Chrome or Nickel P.
122B, 1½″	2/10	3/9
122B, 2″	3/9	4/8
Cup Pattern, 3″ Diam. x 2″	9/–	9/10
Hospital Pattern, 4″ Diam. x 2″	11/8	14/1
Sanitary, 4″ x 2″	37/7	—
Sanitary, 4″ x 2½″	42/7	—

Grates (Floor Plain)—Each—Plus 24⅔% Surcharge.

	1¼″	1½″	2″	2½″	3″	3½″	4″	5″	6″
Brass ...	10d.	10d.	10d.	1/2	1/9	1/10	2/1	3/9	5/–
Chrome or Nickel P.	1/5	1/5	1/5	1/11	2/5	2/8	3/–	4/9	5/11

Grates (Trapscrew)—Each.

	3″	3½″	4″	6″
Round, Brass	7/6	7/8	6/9	24/9
,, Chrome or Nickel P.	8/5	8/8	7/9	29/2
Square, Brass	—	—	6/11	—
,, Chrome or Nickel P.	—	—	8/–	—
Domed, Brass	—	—	12/8	—
,, Chrome or Nickel P.	—	—	15/–	—

Grates (Urinal).

2″, Brass, 19/6; Chrome or N.P., 22/– each.

Gully Sleeves.—Each.

	2″	2½″	3″
Plain	5/2	7/2	8/5
With Eye	13/10	15/10	20/9
With Eye and Vent	—	19/2	22/5

Gully Tops.—Each.

	2″	2½″	3″
Single Branch	17/4	18/1	30/3
Double Branch	20/8	—	—

Gully Risers.—Each.

	4″	6″	9″	12″	15″
Plain	11/5	13/2	16/4	24/–	27/11
Grated, Brass	13/9	15/6	18/11	27/3	30/3
Grated, Chrome or Nickel P.	14/7	16/4	19/10	28/3	31/3

Junctions.—Each.

	1¼″	1½″	2″	2½″	3″
Plain 85-deg. & 88½-deg. ...	4/5	5/5	8/8	20/2	26/6
With I.O., 85-deg. & 88½-deg.	5/10	7/1	10/10	23/–	29/7
Plain, other deg. ...	5/8	6/11	10/10	22/5	33/1
With I.O., other deg.	7/7	8/10	13/1	23/11	35/4

Sockets (Sanitary).—Each.

	1¼″	1½″	2″	2x1½″	2½″	3″
Plain	—	—	—	6/11	—	—
With I.O.	7/2	9/3	10/11	—	13/1	24/4
With Flanged Access ...	—	—	33/3	—	38/6	43/2

Syphonic Connections, 4-in.—Each.

	Brass	Chrome or Nickel P.
Vented Bend for P. Trap	43/9	63/2
Straight Connection for P. Trap	46/9	58/8

Traps (Union).—Each.

	1¼″	1½″x1¼″	1½″	2″
P. with I.O., Brass	12/4	13/–	13/2	16/4
,, Chrome or Nickel P. ...	16/2	16/11	17/–	20/4
S. with I.O., Brass	15/5	15/11	15/11	19/8
,, Chrome or Nickel P. ...	18/6	19/9	19/9	24/5

Vents (Anti-Syphon).—Each—Plus 24¾% Surcharge.

	1¼″	1½″	2″
Brass	26/6	26/6	31/8
Chrome or Nickel P.	30/4	31/6	37/–

GAS BRASSWARE—Plus 24¾ per cent. Surcharge.

Cocks (Gas Main M. and F.).—Each.

	¼″I.	⅜″I.	½″I.	¾″I.	1″I.	1¼″I.	1½″I.	2″I.	2½″I.	3″I.
Brass, Sq. Hd. Ord. Way	4/–	4/9	6/–	7/3	8/7	19/3	24/5	35/–	126/1	148/9
Brass, T.Hd. Ord. Way	4/–	5/–	5/10	7/–	8/7	19/3	24/5	—	—	—
Chrome or Nickel P., T.Hd. Ord. Way ...	—	—	7/–	8/2	10/2	—	—	—	—	—
Brass, T. or Sq. Hd., Full Way ...	—	—	7/9	9/10	11/3	—	—	—	—	—
Chrome or Nickel P., T. or Sq. Hd. Full Way ...	—	—	8/9	11/–	13/–	—	—	—	—	—
Brass, T.Hd., Full Way, Sp. Loaded	—	—	—	7/3	9/8	—	—	—	—	—
Chrome or Nickel P., T.Hd., Full Way, Sp. Load	—	—	—	8/9	11/9	—	—	—	—	—

Unions.—Each.

	⅛″	¼″	⅜″	½″	¾″	1″	1¼″	1½″	2″	2½″	3″
Screwed for Iron (Female, Brass) ...	1/6	1/10	1/10	1/10	2/–	3/–	6/7	8/7	15/2	44/11	68/6
Screwed for Iron (Female, Chrome or Nickel P.	2/2	2/8	2/8	2/9	3/–	4/1	—	—	—	—	—
Screwed for Iron (M. & F., Brass) ...	1/6	1/11	1/11	2/6	3/5	4/9	7/6	9/5	14/11	45/10	68/6
Screwed for Iron (M. & F., Chrome or Nickel P.)	2/2	2/9	2/9	3/4	4/4	5/10	—	—	—	—	—
Lead and Iron (T. & S.)...	—	—	—	2/2	2/3	2/7	5/–	—	—	—	—

MISCELLANEOUS PLUMBING MATERIAL.

Inspection Boxes—Water Board Pattern, 3/6; Path Boxes, 6/6; Cast Iron Grates, 2/3; Flush Pipes (Telescopic), 11/–

Plugs and Washers.—Each.

1¼″ N.P., for Basin with C. and L.	7/9
1½″ N.P., for Basin with C. and L.	10/1
1¼″ N.P., for Basin, Canberra Pattern	8/8
2″ N.P., for Porcelain Bath	9/11
2″ N.P., for Bath, Canberra Pattern, with M.E.C. & L.	13/–
1½″ Brass, Round, for Galvd. Bath	2/–
1 ″ Brass, Round, for Galvd. Bath	2/7
2″ Brass, Round, for Galvd. Bath	2/10
2″ N.P., for Sink, Canberra Pattern	12/–
2″ N.P., for Sink, Earthenware, with C. and L.	10/4
2″ Brass, for Sink, Earthenware, with C. and L.	9/3
1½″ Brass, for Wood Tub, without C. and L.	7/2
1½″ Brass, for Wood Tub, with C. and L.	8/7
2″ Brass, for Wood Tub, without C. and L.	7/9
2″ Brass, for Wood Tub, with C. and L.	9/6

Shower Heads.—Each.

	6″	7″	8″	9″	10″
Copper	4/5	6/3	7/4	13/–	20/–
Nickel P.	6/1	8/7	10/9	16/6	22/4
Chrome P.	7/11	10/–	13/3	18/11	27/3
Nickel P., Anti-splash	10/7	13/2	15/8	—	—
Chrome P., Anti-splash	13/–	15/6	18/9	—	—

Insulating Material.

Asbestos Cord ... ⅛″ to ¾″, 6/9 per lb.
Asbestos Lagging ... Full Bags, 16/6 per cwt.; loose, 2d. per lb.
Magnesia Lagging (85 per cent.)—Single Bags (each 40 lbs.), 31/– each.

Hooks (Pipe)—Per Doz.

	¾″	1″	1½″	2″	3″	4″
Black	1/9	1/11	2/6½	2/8	3/8	4/4¾
Galvanised	2/1½	2/4¾	3/3¾	3/6¼	4/11¼	6/5

Vent Stays (Complete with Band)—6/– per set.

CISTERN BRACKETS.

	£	s.	d.
Wrought Iron, Light	3	0	set
C.I. Cantilever	4	0	per pair

BATH HEATERS—ELECTRIC.

	£	s.	d.
"Dux" instantaneous Standard 3 Phase bath heater	11	16	0
"Dux" instantaneous Gravity feed automatic hot water system	19	14	0
"Dux" single phase 12½ gallon storage bath heater	25	18	0

For further information see page 17.

LIGHTING AND HEATING

HOT WATER SUPPLY.

Whilst the modern hot water system can be readily fitted into an existing home, savings of up to 25 per cent. may be made on the installation if the system is fitted when building. When included in the capital price of the home a hot water system probably means less than 1/6d. on the weekly repayments.

Types of Systems Available.

Storage type hot water systems are available in three main types depending on the fuel employed.

Solid Fuel or Coke Heaters.

These consist of a small manually operated furnace which heats the water and by convection the hot water is circulated to an overhead storage tank. Very often double reticulation, i.e., flow and return, is used to give almost instant hot water immediately a tap is turned on. As large bore pipes are used this reticulation does not lend itself to later conversion to either gas or electric units.

This type of unit is designed for very large homes, blocks of flats, hospitals, etc., and their use in the domestic field is restricted.

Solid fuel heaters are usually coke fired and more and more people are finding that the additional worry of obtaining coke supplies together with the necessity for manual cleaning and stoking of the furnace more than offsets the lower operating costs.

Whilst still finding some uses in the industrial or commercial field this type of unit is now rarely installed in private dwellings.

Gas Heaters.

In designing any hot water system manufacturers usually take the intrinsic characteristics of the particular fuel in question and design their appliance around those advantages. Gas is unique in that it gives the maximum amount of flexibility possible. This allows high heat inputs to be obtained and therefore gas hot water systems are usually small and compact and incorporate the " quick recovery " feature. In other words the storage tank itself it kept small and the gas burning rate is adjusted so that the heater quickly replaces any hot water used. For instance, a 15 gallon gas heater is suitable for the average family of four to five people. A bath can be drawn every 20 minutes night and day without fear of exhausting the system.

Due to the small size of these units it is often possible to make them of heavy gauge steel suitable for withstanding normal water mains pressure. In such cases the heater is connected directly to the cold water main and both hot and cold water are supplied throughout the house at equal pressures.

In what is known as the medium pressure gas heater, the unit itself stands on the floor as with the mains pressure unit but in this case the cold water is supplied to the heater from a small overhead feed tank usually situated in the ceiling. This medium pressure type of unit is most desirable where excessive cold water pressures exist. In addition as the medium pressure unit is made of light gauge copper it is virtually an everlasting job and this again commends it to many people.

Electric Heaters.

Due to the high demand for electricity during the day as compared with the night demand, electricity undertakings usually encourage the use of electricity at night by offering specially reduced tariffs. This is understandable as there is no method of storing electricity and the Power Station must, of necessity, keep a large number of boilers operating to meet the big demand which occurs the following morning. Fuel required to maintain these boilers would be virtually wasted if not converted into usable electricity and for this reason exceedingly low tariffs are usually available for using electricity to heat water during the "off peak" period. Often this special "off peak" tariff is as low as one third of the usual price of electricity.

The "off peak" heater is simply one which is controlled by a time mechanism so that the power is only available during this "off peak" period. By removing the time control and allowing electricity to be available 24 hours a day the unit becomes a "continuous rated" heater.

As "off peak" units only heat the water during the night they must have comparatively large storage capacity to cope with the hot water requirements throughout the following day. Usually "off peak" heaters vary from 45 gallons to 80 gallons capacity, even larger, for average sized homes.

Continuous heaters are usually 30 to 45 gallons capacity.

Selecting the type of unit.

In selecting the type of unit best suited for a particular home the personal leanings of the customer are probably the most important factor. Some people prefer gas and vice versa. It is often a good idea to check on the other appliances in the home, i.e., refrigerator, stove, room heating, etc.

The special rate offered by most gas undertakings for a storage water heater is usually extended to all other appliances after a certain base quantity of gas has been consumed. As this special discount is substantial, it naturally pays a person having an all gas home to fit a gas hot water system.

Due to the large storage capacities required, "off-peak" water heaters are usually installed in the ceiling to save valuable floor space. Care must therefore be taken when selecting the heater to ensure that sufficient space exists in the ceiling to take the unit. As floor model electric heaters are usually made only in 45 gallon sizes the absence of sufficient ceiling space may decide in favour of a gas unit.

Size of Unit Required.
A. Gas.

If the gas unit incorporates the "quick recovery" feature the maker's general recommendation is that a 15 gallon unit will suit any one bathroomed house. This is based on the fact that the reheating cycle is virtually faster than the hot water can be used in one bathroom. For large two bathroomed homes or for industrial purposes a 35 gallon size is recommended and for some installations these can be paired or run in series. This would only be in unusual industrial applications and in these cases it is recommended that the manufacturer be contacted for his specific recommendations for the particular job in hand.

The above remarks apply to both mains pressure and medium pressure gas heaters, the " quick recovery " feature being incorporated in both types.

B. Electric Heaters.

Greater care must be exercised in specifying the correct size with " off peak " water heaters as the home is definitely limited to that amount of hot water each day. Whereas undersizing in a gas unit merely necessitates a few minutes wait for the heater to recover, undersizing with the electric unit means no more hot water that day. Closer attention, therefore, must be paid to the standard of living and the anticipated habits of the family concerned. It has been proved, for instance, that a 45 gallon heater is ample for a family of four to five people in the tradesman class of family. In a higher income group, however, a 60 gallon unit would definitely be recommended. As the difference in price between each size unit is not particularly great it always pays to recommend on the liberal side.

As a general rule 45, 60 and 80 gallon sizes would cater for 90 per cent. of domestic requirements where " off peak " tariffs exist. For particularly large sized homes there is considerable merit in fitting two 80 gallon units each serving a separate portion of the home. This not only often saves installation costs, but has the added advantage of having two sections of the home independent from each other. The initial purchase cost of the two heaters would be approximately the same as one 150 gallon unit.

Locating the Unit.

The heater should always be located as close as possible to the hot water point used the greatest number of times. In a home this is usually the kitchen sink. In addition " off-peak " heaters situated in the ceiling should be located, if possible, over two walls continuous to the ground. Sufficient head room must also be allowed for servicing or adjusting the ball cock in the cold water feed tank. Sound planning and grouping of kitchen, bathroom, and laundry reduces not only initial installation expense of hot and cold water piping and draining but effects continuous savings in hot water operating costs.

In locating the gas heater care should be taken to ensure correct fluing. This is normally carried out in accordance with the local Gas Company's installation requirements.

Hot Water Pipe Sizes.

Pipe sizes are substantially common for all types of hot water systems with the exception of the gas mains pressure unit. Being mains pressure, pipe sizes can be reduced thus saving installation costs and the amount of " dead " water lying in the pipes.

(a) **Mains pressure units**—use $\frac{3}{8}''$ screwing for the main line with $\frac{1}{4}''$ screwing for individual hot water points. If the mains pressure is exceedingly poor these sizes can be increased to $\frac{1}{2}''$ and $\frac{3}{8}''$ screwing respectively.

(b) **All other units**—other than mains pressure should use $\frac{1}{2}''$ screwing for the main line to the first branch, then $\frac{3}{8}''$ screwing to all hot water points.

Lagging of Hot Water Pipes.

It is essential to lag hot water pipes to effect maximum efficiency. In all cases use at least $\frac{1}{4}''$ of hessian cored hair felt or its equivalent. Where winter temperatures consistently fall below 50° F. use $\frac{1}{2}''$ to $\frac{3}{4}''$ of insulation. Wrap hair felt spirally round the pipe and securely bind with copper or galvanised tie wire.

In cavity brick walls or exposed positions, however, protect this hair felt with a wrapping of sisalkraft or canvas covering. Insulate all buried pipe work and wrap in hessian or canvas in addition to hair felt. In the case of in the roof and medium pressure units lag the expansion pipe as this is always full of hot water. Lagging the cold water pipe close to the heater also pays dividends.

GAS STORAGE WATER HEATERS.

Series 10 Mains Pressure Water Heaters.

	£	s.	d.	
15 gallon	27	15	0	—Domestic Model—1 Bathroom.
35 ,, ...	35	10	0	—2 Bathrooms—Cafes, Factories, etc.

Series 20 Medium Pressure Water Heaters.

	£	s.	d.	
15 gallon	28	15	0	—Domestic Model.
35 ,, ...	37	2	6	—2 Bathrooms—Cafes, etc.

Series 20 Heaters are installed in conjunction with an overhead feed tank (£5) or a Rheem water pressure reducing valve (£6 17s. 6d.).

Gas Installation Costs—Labour and Material:—Approx. £9 per point.

ELECTRIC STORAGE WATER HEATERS.

"In the Roof" Models.		£	s.	d.
(a) Standard Roof Models	—305/30	26	0	0
	305/45	28	10	0
	305/60	32	7	6
	320/80	36	13	0
(b) Squat Roof Models	—320/60	34	0	0
	305/80	39	10	0
(c) Falling Level Extra Squat Roof Models—				
	400/45	34	12	0
	400/60	37	10	0
	400/80	43	15	0

Electric Installation—Labour and Materials, Approx. £10 per point.

"On the Floor" Models.

Series 330 Medium Pressure Water Heaters.

	£	s.	d.
30 gallon ...	26	0	0
45 gallon ...	29	0	0

Series 330 Heaters are installed in conjunction with an overhead feed tank (£5) or a Rheem water pressure reducing valve (£6 17s. 6d.).

Single Phase Storage Bath Heaters.

	£	s.	d.	
Model 340/15 ...	23	4	0	(Bath heater only).
345/15 ...	28	14	0	(Bath heater with shower fittings).

Dairy Water Heater.

Model 350/15 ... £21 10 0

Series 340, 345 and 350 are all "Push Through" type—can be connected direct onto Mains Water supply.

For Current Prices See Advertisement, Page 61.

General Hot Water Data.

The British thermal unit (B.Th.U.) is the amount of heat required to raise 1 lb. of water 1°F.

One gallon of water weighs 10 lbs.
One cubic foot of gas (Sydney) contains 511 B.Th.U.
One kilowat hour (one unit) equals 3415 B.Th.U.
Electric heaters are usually set at 170°F.
Gas heaters are usually set at 140°F.
Cold water temperature usually taken approximately 65°F.
Usual shower temperature = 110°F.
Usual bath temperature = 105°F.
Usual dishwashing temperature = 130°F.
Boiling point = 212°F.

From the above most hot water problems can be solved.

Example :—How much water would have to be drawn from
(a) An electric heater ; or
(b) A gas heater.
to give a bath of 10 gallons of water at 105°F.?

Solution :

(a) **Electric Heater.**

Let A = the amount of water from the heater in gallons.
Then 10—A must = the amount of cold water in gallons.
Heat lost by hot water = heat gained by cold water.
(Lbs. of hot water) x temperature fall = (lbs. of cold water) x temperature rise.
10A x (170—105) = 10 (10—A) x (105—65).
10A x 65 = (100—10A) x 40.
650A = 4000—400A.
950A = 4500.
A = 4·2 gallons.

(b) **Gas Heater.**

Let A = the amount of water from the heater in gallons.
Then 10—A must = the amount of cold water in gallons.
Heat lost by hot water = heat gained by cold water.
(Lbs. of hot water) x temperature fall = (lbs. of cold water) x temperature rise.
10A (140—105) = 10 (10—A) x (105—65).
10A x 35 = (100—10A) x 40.
350A = 4000—400A.
750A = 4000.
A = 5·3 gallons.

ALADDIN PRESSURE KEROSENE HEATER COOKER.

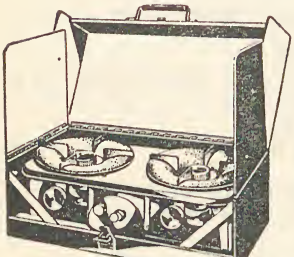


Pressure-operated kerosene dual-purpose appliance sends powerful heat currents in all directions—not just in front. Gives glowing red heat which can be raised or lowered as desired, and with easy-carrying handle the heater can be carried from room to room even while it is burning. Quickly and easily converted into efficient cooker.

Fount Capacity.—3½ pints gives 9 hours continuous burning at highest capacity. 1 gallon of kerosene gives approximately a week's normal heating—or **two weeks'** cooking.

Approximate Price, £10 0s. 0d. each.

ALADDIN PRESSURE KEROSENE 2-BURNER STOVE.

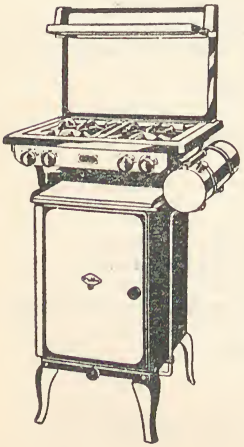


Compact, pressure-kerosene stove with adjustable heat, self-pricking burners. Odourless, completely safe and economical. The metal carrying case serves as windshield for outdoor cooking. The Portable Stove is the ideal cooking appliance for campers, as well as for weekenders and holiday homes.

Tank Capacity, 1¾ pints — sufficient for cooking 12 to 15 average meals using both burners.

Approximate Price, £10 0s. 0d. each.

ALADDIN 5-BURNER PRESSURE KEROSENE RANGE.



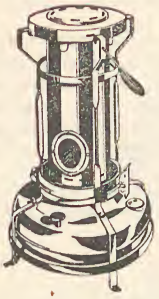
Ideal for Country Homes.

The standard 5-burner range and the Elevated Oven Ranges are identical as far as operation and running costs are concerned, and the data below proves that this is the most economical method of cooking. Both ranges are porcelain-finished, equipped with adjustable self-pricking burners, insulated ovens and are absolutely safe. Use the data given below to compare running costs with any other type of fuel range.

Tank Capacity of 5-burner ranges: 1 gal. Four Pints of Kerosene give a full week's cooking for a family of four. (Tested by home economist for economy of use).

Approximate Price £54 0s. 0d. each.

ALADDIN BLUE FLAME NON-PRESSURE KEROSENE HEATER.



The cleanest and simplest method of home heating ! Aladdin Blue Flame Heater warms the **whole room**—radiates a steady, even heat with a minimum of fuel. As every drop of kerosene is converted into **heat,** the Blue Flame is completely odourless, quiet and simple to operate. No other heating method can compare in economy with the Blue Flame!

Fount Capacity, 1 gal.—gives a full week's heating in the average home.

Approximate price, £9 0s. 0d.

ALADDIN NON-PRESSURE KEROSENE MANTLE LAMPS.

Safety—simplicity—and economy have made the Aladdin non-pressure kerosene mantle lamps well known all over the world. Burning ordinary lighting kerosene—the cheapest and most readily available of all fuel—the Aladdin lamps give a steady, white 75 candle power light, without smoke, noise or odour. Aladdin non-pressure lamps are efficient, durable and burn only 6 per cent. kerosene, 94 per cent. air—**they cost less to run than any other form of lighting.**

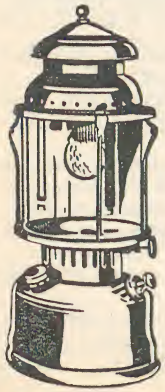
Non-pressure Mantle Lamps give 75 candle power of soft white light.

Fount Capacity, 1½ pints : In normal use, 4 pints of kerosene provide a full week's lighting.

Approximate Price, £5 to £6 each.



ALADDIN PRESSURE-KEROSENE STORMPROOF LANTERN.



A very efficient outdoor lantern. Sturdy, dependable, and amazingly economical in use, it is fitted with a carrying handle, hanging hook, and a downward or side reflector is available as an extra. Independent scientific tests certify that the Stormproof gives a full 300 candle power light under any conditions. As a test a lantern was hung over a cliff in wind and rain for hours and did not fail. This is a most advanced development in pressure-kerosene lighting. Two pints of kerosene give a week's lighting.

Fount Capacity 1¾ pints.

Approximate Price, £6.

See Advertisements, Pages 6 and 7.

NEON LIGHTING

Neon advertising signs use electrically operated discharge tubes filled with special gases, either Neon or Mercury or a mixture with others, sometimes employing fluorescent powder to produce special colours. The colours available include Red, Orange, Pink, Amber, Gold, Yellow, Green, Blue, Soft White and White. The cold cathode tubes, as they are known, can be bent to the shape of any letter or pattern, or used to back-light a silhouette.

The tubes are operated by high voltage transformers which are used within the sign equipment, and connected to the ordinary 240 volt A.C. power mains in the usual way.

Neon sign tubes are generally associated with coloured porcelain reflectors on which the principal message is repeated.

Footway Signs : Double faced box type signs up to 8 ft. long suspended under shop awnings or bracketed from the front wall at an average height of 9 ft. above the pavement.

Interior Signs : Either in box form, or silhouette letters, or shaped bent tube mounted on or behind shop fixtures.

Horizontal Signs : Above the awning or the awning height, generally single or double faced box with exposure to both traffic directions.

Vertical Signs : Attached to the building face and generally double faced on a triangular box, particularly useful for multi-storey buildings.

Skeleton Letter Signs : Comprise flat or channelled metal letters of skeleton form carrying single or multiple tubes and mounted above the awning or parapet, or alternatively, plain porcelain letters in silhouette against an illuminated background.

Sky Signs : Skeleton letters or similar construction of large size mounted above structural frames supported on top of the building and suitable where there is a long viewing distance.

Tube Outlining : Comprises bare tube directly attached to walls, parapets, awnings, interior ceilings, or fixtures either to outline architectural features, a sign message or decorative pattern.

Changeable Letter Signs : Specially designed for theatres or premises where regular change of message can be obtained by the use of removable silhouette letters illuminated from behind.

Sign Overlays : Footway, horizontal, vertical, skeleton and sky signs can all carry an additional message in bare tube supplementing the principal theme and overlaid upon it.

Animation : Automatically operated mechanisms can be provided for a sequence of message and overlays or special rippling effects.

Current Consumption : Discharge tubes are economical and current consumption is small. Approximately one kilowatt of electricity per hour will illuminate 100 ft. of tubing used.

Fluorescent Interior Lighting : The same cold cathode tubes are also used for interior lighting in white where they have the particular advantage of shadow free illumination without emission of heat. They are commonly supplied in the form of straight tubes in standard units for industrial or decorative lighting in the shop, factory, etc.

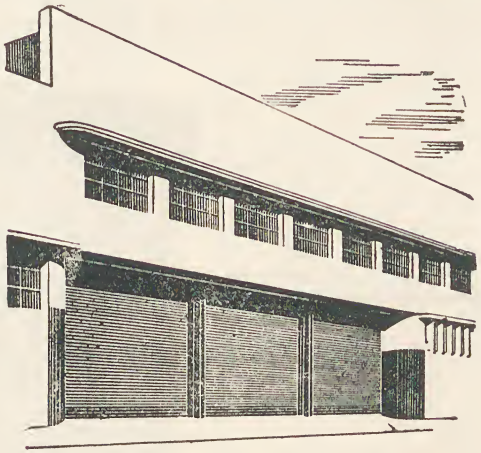
Lighting equipment may be purchased at monthly rental covering maintenance or on a cash basis.

Claude Neon Ltd. provide up to the minute service for signs and lighting and a technical staff of engineers is at your disposal.

For advice and service See Advertisement, Page 74.

ROLLER SHUTTERS, GRILLES AND SLIDING DOORS

" WATERLOO " STEEL ROLLER SHUTTERS.



" **Waterloo** " **Steel Roller Shutters** are used where economy of space is a consideration, in Shop fronts, Market entrances, Garages, Cart entrances, and for many other purposes where it is practically impossible to use ordinary sliding doors or other types of gates.

Steel Roller Shutters are fire-resisting, easy to open and close, but difficult to break open by unauthorised persons.

Locking from either inside or the outside is provided by means of a sliding latch on each end of the bottom rail, which engage in slots in the channel guides. Provision is made for the attachment of padlocks as extra security.

Wicket Gates (standard size, 3 ft. 6 in. x 1 ft. 6 in.) either centre or side hung, can be designed in the curtain when required. A night latch is fitted to each gate and any number of keys can be supplied.

Shutters are usually operated by spur wheel and pinion gear controlled by an endless chain, but a worm and bevel gear, operated by a crank handle and shaft, may be adopted to suit special requirements.

Size of Shutters :—Add 18″ to height and 6″ to width of opening.

Price (Approximate).

Special quotes—up to 100 sq. ft.

Over 100 sq. ft., 11/– per sq. ft.

Complete with gears, delivered and erected, or packed F.O.R. Sydney.

Country orders—Freight extra.

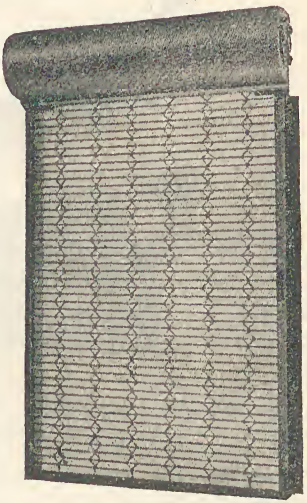
Current prices and quotations, refer ADVERTISEMENT, PAGE 69.

WOOD ROLLER SHUTTERS.

Prices from 12/– to 15/– per square foot.

Wormald's Rolling Grille is designed to replace collapsible gates, which are often unwieldy and clumsy in operation. The whole grille coils compactly above the lintel. It is so accurately counterbalanced it opens and closes with maximum ease. It can be locked when closed. The Rolling Grille blends perfectly with any architecture.

The Grille proper is made of round steel bars carrying or connected by strong pressed steel links. It coils in a barrel journaled in heavy cast iron brackets, and is locked in and travels in steel guides mounted at the side of the opening. Helical springs enclosed in the barrel provide perfect counterbalance. Similar to the steel rolling door, the grille can be mounted on the face of the wall, with coil above the bottom of the lintel, or in the opening with coil between jambs or in reveals provided. The building can be designed to house and conceal all working parts.



The Grille can be arranged for hand operation by means of a handle in the bottom bar, by a chain working from reduction gearing, or by electric power equipment, the method employed usually being determined by the size of the grille.

For positive protection a secure locking arrangement is provided.

Here are a few ideal uses for the Rolling Grille.

Store Fronts; Show Windows and Display Rooms containing valuable merchandise; day time protection of Vaults, bank-tellers; Factory entrances; Elevator Shafts; School Buildings; Concessions; Piers and Platforms; Public Buildings and Homes.

To determine size of Grille, add 18″ to height of opening, and 6″ to width of opening.

Prices (Approximate).

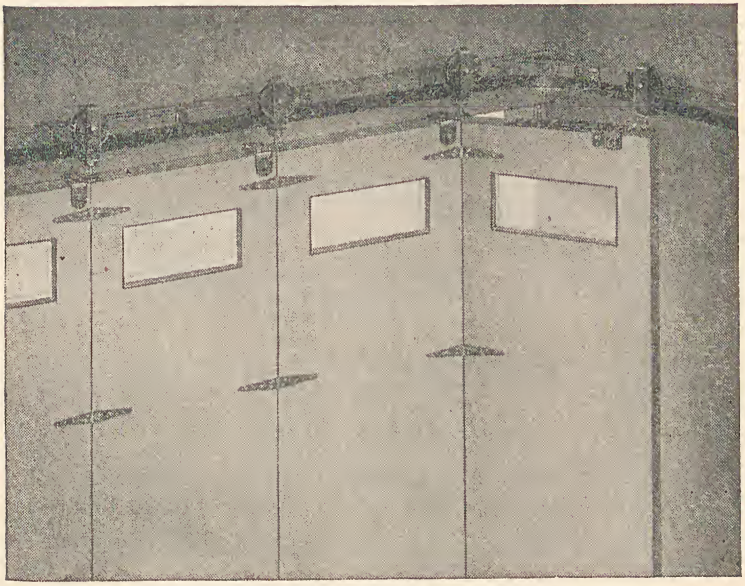
Delivered and erected, or packed F.O.R. Sydney.

50 to 100 sq. ft., approx., 18/– per sq. foot.

Over 100 sq. ft., approx., 15/– per sq. foot.

Current prices and quotations, refer ADVERTISEMENT, PAGE 69.

BANGOR SLIDING DOOR TRACK and FITTINGS.



Round the Corner.

Sliding Door sets are available for all types of sliding doors, and for all methods of fixing, viz. : Single and Double, Parallel, Accordion doors, Angle-type fixing, Fold-aside, and Round the Corner (as illustrated). Manufactured with ball or roller bearings, as suitable or desired.

PRICES—PLUS 10% SALES TAX
SET NO. 200.

" Bangor " Parlour door Single

200 " S "	£	s.	d.
2′–6″ Opening ...	3	7	11
3′–0″ ,, ...	3	10	3
3′–6″ ,, ...	3	14	0
4′–0″ ,, ...	3	16	3
5′–0″ ,, ...	4	3	5
6′–0″ ,, ...	4	11	10

" Bangor " Parlour Door Double

200 " D "	£	s.	d.
5′–0″ Opening ...	6	10	4
6′–0″ ,, ...	6	15	0
7′–0″ ,, ...	7	2	8
8′–0″ ,, ...	7	7	1
10′–0″ ,, ...	7	11	5

SET NO. 205.

" Bangor " Cottage Door Single

205 "S"		£	s.	d.
2'–6"	Opening ...	3	8	5
3'–0"	,, ...	3	10	7
4'–0"	,, ...	3	16	4
5'–0"	,, ...	4	3	7
6'–0"	,, ...	4	12	0

" Bangor " Cottage Door Double

205 "D"		£	s.	d.
5'–0"	Opening ...	6	4	9
6'–0"	,, ...	6	15	5
7'–0"	,, ...	7	2	4
8'–0"	,, ...	7	6	9

SET NO. 210

" Bangor " Light Barn Door Single

210 "S"		£	s.	d.
3'–0"	Opening ...	3	12	5
4'–0"	,, ...	3	18	0
5'–0"	,, ...	4	7	6
6'–0"	,, ...	4	18	4
7'–0"	,, ...	5	3	11
8'–0"	,, ...	5	9	8
9'–0"	,, ...	5	17	0
10'–0"	,, ...	6	4	1

" Bangor " Light Barn Door Double

210 "D"		£	s.	d.
6'–0"	Opening ...	6	18	3
7'–0"	,, ...	7	6	0
8'–0"	,, ...	7	11	10
9'–0"	,, ...	8	3	3
10'–0"	,, ...	8	10	7
12'–0"	,, ...	9	1	3
14'–0"	,, ...	9	19	11
16'–0"	,, ...	10	12	10

SET NO. 215.

" Bangor " Heavy Barn Door Single

215 "S"

		£	s.	d.
5'–0"	Opening ...	4	19	8
6'–0"	,, ...	5	10	7
7'–0"	,, ...	5	18	4
8'–0"	,, ...	6	6	3
9'–0"	,, ...	6	15	7
10'–0"	,, ...	7	5	2
11'–0"	,, ...	7	14	3
12'–0"	,, ...	8	2	0

" Bangor " Heavy Barn Door Double

215 "D"

		£	s.	d.
10'–0"	Opening ...	9	14	8
12'–0"	,, ...	10	11	9
14'–0"	,, ...	11	10	4
16'–0"	,, ...	12	7	7
18'–0"	,, ...	13	8	2
20'–0"	,, ...	14	5	5
22'–0"	,, ...	15	4	2
24'–0"	,, ...	16	1	6

SET NO. 270.

" Bangor " Light Open Rail Type (To 100 lbs.).

	£	s.	d.
Rail, 6'–0" Length		11	9
Rail, 8'–0" Length		14	1
Rail, 18" Extensions		3	9
Connecting Brackets		1	7
Hangers, per pair	1	1	8

SET NO. 275.

" Bangor " Medium Open Rail Type (To 600 lbs.)

	£	s.	d.
Track (including Distance Pieces, Stop Ends and Bolts), per foot		3	6
Hangers, per pair	3	2	2
Centre Stops, each		1	8

SET NO. 280.

"Bangor" Heavy Open Rail Type (To 1,500 lbs.)

	£ s. d.
Track (including Distance Pieces, Stop Ends and Bolts) per foot	6 5
Hangers, per pair	3 14 4
Centre Stops, each	1 8

SET NO. 285.

"Bangor" Round-the-Corner

	£ s. d.
3 Door Set for 8′–0″ Opening	8 10 0

SET NO. 290.

"Bangor" Round-the-Corner

	£ s. d.
4 Door Set for 8′–0″ Opening	9 19 6
18″ Extension Pieces	3 9
Connecting Brackets	1 7

SET NO. 220.

"Bangor" Light Parallel Doors.

	£ s. d.		£ s. d.
15′–0″ Opening ...	11 18 0	17′–0″ Opening ...	13 2 0
16′–0″ ,, ...	12 2 10	18′–0″ ,, ...	13 6 11

SET NO. 225.

"Bangor" Heavy Parallel Doors.

	£ s. d.		£ s. d.
15′–0″ Opening ...	14 11 7	19′–0″ Opening ...	17 4 9
16′–0″ ,, ...	14 16 5	20′–0″ ,, ...	17 4 9
17′–0″ ,, ...	15 15 8	22′–0″ ,, ...	18 9 7
18′–0″ ,, ...	16 0 7	24′–0″ ,,	19 9 0

SET NO. 230.

"Bangor" Light Accordion Doors (80 lbs. Weight).

	£ s. d.
Track to one side (including Brackets), per foot ...	5 4
Track to two sides (including Brackets), per foot ...	6 0
Carriages and Door Plate, each	1 3 3

SET NO. 235.

"Bangor" Heavy Accordion Doors (120 lbs. Weight).

	£ s. d.
Track to one side (including Brackets), per foot ...	6 0
Track to two sides (including Brackets), per foot ...	6 8
Carriages and Aprons, each	1 3 3

SET NO. 255.

"Bangor" Angle Door Single 255 "S"

	£ s. d.
3′–0″ Opening ...	5 11 7
4′–0″ ,, ...	5 19 1
5′–0″ ,, ...	6 7 6
6′–0″ ,, ...	7 9 6
7′–0″ ,, ...	7 19 6
8′–0″ ,, ...	8 9 0

"Bangor" Angle Door Double 255 "D"

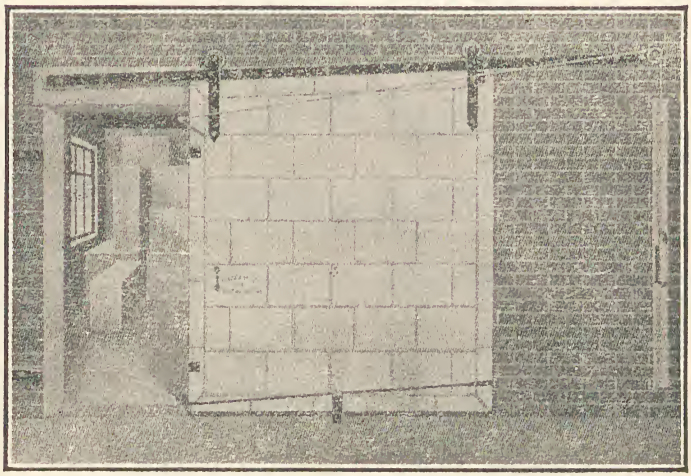
	£ s. d.
8′–0″ Opening ...	12 2 3
10′–0″ ,, ...	12 12 5
12′–0″ ,, ...	13 4 4
14′–0″ ,, ...	15 6 0
16′–0″ ,, ...	16 7 6

All prices are subject to 10% Sales Tax.

For Current Prices and Quotes—See Advertisement, Page 69.

FIRE DOORS AND EXTINGUISHERS

"WATERLOO" (TIN-CLAD) FIRE-DOORS.
Manufactured to Fire Underwriters' Requirements.



Sliding Door Type—Automatic Closing.

Their principal use is to act as fire cut-offs, where usually Double Doors (i.e., one on each side of the wall opening) of the Automatic Closing Type are required to conform with insurance requirements.

Doors of the Automatic Closing Type are also required on Lift Well openings. Self-closing Doors, controlled by means of a spring or balance weight, are allowable to openings of Stair Enclosures. Municipal and other regulations, however, usually prefer Doors of the Hinged type in such instances.

These doors are available as double sliding doors, also hinged type with automatic closing attachment. Hinged doors are also available in two leaves with rebated meeting styles. Fire Doors must overlap the opening by at least 3″ on each side and at the head, and seat on a sill of fire-resisting construction.

APPROXIMATE PRICES.

Delivered and erected, or packed F.O.R. Sydney.

Height.	Width.		£ s. d.	£ s. d.
7′ 0″	x 3′ 0″	(sliding or hinged) ...	36 10 0	39 4 0
7′ 0″	x 4′ 6″	,, ,, ...	41 0 0	44 7 2
7′ 0″	x 8′ 0″	(Sliding only) ...	60 10 0	68 11 4
8′ 0″	x 4′ 6″	(sliding or hinged) ...	43 4 0	48 0 7
8′ 0″	x 6′ 0″	,, ,, ...	46 10 0	58 3 9
10′ 0″	x 10′ 0″	,, ,, ...	78 13 0	104 16 2

Current Prices and Quotations—refer ADVERTISEMENT, PAGE 69.



" SIMPLEX " FIRE EXTINGUISHERS.

CARBON TETRACHLORIDE TYPE (CTC).

Standard Colour : Polished Copper with Brass Embossed instruction Plate.

Capacity : One Quart.

Weight, when charged : 8 lbs.

Size : 14 in. in Length, 3 in. in Diameter.
£4 10s. 0d. + 8¼ per cent. Sales Tax.

Recharging Instructions : It is only necessary to recharge this Extinguisher after use, although it is sound practice to carry a spare recharge in stock. Always ask for REFILL No. 10.—11/- plus Tax.

Manufactured from 20 gauge copper fitted with double action plunger type pump mechanism.

This Extinguisher is supplied, charged ready for use, with mounting bracket.

Specified For : Protection of small electrical switchboards, lift motor rooms, motor lorries and cars, and small electrical risks. Wherever electricity is used, there is a fire risk which cannot be effectively handled by either " Soda Acid " or " Foam Type " Extinguishers. Electrical risks demand special protection. " Simplex " Auto Type Fire Extinguishers are made to fill this demand.

Instant Action : The " Simplex " Auto Type Fire Extinguisher has a double action pump. Both up and down strokes project a continuous stream of fire fighting liquid. The Extinguisher can be used in any position. The liquid used (Carbon Tetrachloride) does not conduct electricity, and generates a volume of gas 233 times greater than the volume of liquid used. This gas blankets out oxygen from the fire, thus putting the fire out. It is non-injurious to any electrical equipment.



" SIMPLEX " SODA ACID TYPE FIRE EXTINGUISHERS.

Reversible or Turnover Type.
Standard Colour : Red.
Capacity : 2 Gallons.
£6 5s. 0d. Plus Tax.

Manufactured from 18 Gauge Copper —Safety Tested to 350 Lbs. Per Sq Inch.

(Recharge this Extinguisher annually, or after use. USE REFILL No. 1. 3/6 plus tax. Always quote this number when ordering.)

" Simplex " Reversible Fire Extinguishers are supplied complete with all necessary fittings. A hook for hanging in position, an Instruction Plate and the initial chemical charge.

Specified For: Offices, warehouses, factories, homes, hotels, guest houses, public halls, theatres, country stores and farm buildings. These Extinguishers are recommended for all general fire protection purposes.

By the simple action of turning the extinguisher upside down a powerful fire extinguishing stream is instantly projected up to 40 feet.

This type of extinguisher is particularly suitable for dealing with the first outbreak of fire in ordinary combustible materials, where the quenching and cooling effects of quantities of water—or solutions containing a large percentage of water—is of first importance.

The cooling action of the water in the extinguisher, plus the beating action of the stream of liquid forced on the fire under pressure, is supplemented by (a) a blanketing effect due to the CO_2 generated and released at the burning surface (b) by the salts in solution forming a protective coating.



" SIMPLEX "

FIRE EXTINGUISHER.

1-Gallon Stored Pressure Type (CTC)

Standard Colour: Polished Copper with Brass Etched Instruction Plate.
Capacity: 1 Gallon.
£14 Plus Tax.

Recharging Instructions: Recharge only after use. Always ask for REFILL NO. 12—£1 4s. 0d. plus tax. These Extinguishers are supplied fully charged, complete with all fittings and mounting bracket.

Specified For: Protection of large electrical installations, telephone exchanges, etc. This Extinguisher is operated by a wheel valve which causes the stored pressure to force the liquid (Carbon Tetrachloride) out in a constant stream, which can be projected up to 40 feet.

" LUX " FIRE-FIGHTING EQUIPMENT.

Fixed Installations and Hand Extinguishers.

Some fire hazards and certain articles and plant demand protection from fire by a medium which will act quickly and effectively, yet be free from any after effects.

" Lux " fights fire with quick-acting, clean CO_2 (Carbon Dioxide) Gas. It can be used on the most delicate machinery, the most complex electrical machinery, on valuable papers, documents, fabrics or pictures, on volatile and highly inflammable liquids, without causing the slightest damage and with perfect safety to the operators.

" Lux " gas is discharged under its own pressure, and is a non-conductor of electricity.

" Lux " Hand Extinguishers are available in various capacities, of which the popular sizes are 7½ lbs. (£15 plus tax) and 12 lbs. (£16 10s. plus tax).

Mobile Extinguishers are made in 20 lb. (£28 15s. plus tax), 50 lb. (£61 plus tax), and 100 lb. (£112 10s. plus tax) capacities.

"**Lux**" **Fixed Installation Systems** are manufactured to protect larger fire hazards.



"SIMPLEX" FOAM TYPE FIRE EXTINGUISHERS.

Reversible or Turnover Type.
Capacity : 2 Gallons.
Standard Colour : Blue.
£7 5s. 0d. Plus Tax.

Manufactured from 18 Gauge Copper—Safety Tested to 350 lbs. Per Sq. Inch.

Recharge this Extinguisher annually or after use. USE REFILL No. 7—7/6 plus tax. Always quote this number when ordering.

"Simplex" Reversible Foam Type Fire Extinguishers are supplied with all necessary fittings. A hook for hanging in position, an Instruction Plate and the initial chemical charge.

Specified For : Petrol, tar, oil, varnish and paint risks, inflammable liquids and materials, greases, etc., spray booths and dry cleaning establishments. For use on fires which are difficult to put out, and where a blanketing effect is desired. In all such instances "Simplex" Foam Type Fire Extinguishers are the safest and surest means of effectively and quickly getting these types of fire outbreak under control.

When the Extinguisher is operated, by the simple action of turning it upside down, it forms a dense foam which floats over burning liquids and adheres to solid surfaces. This foam resists heat, cuts off the oxygen necessary for combustion, puts the fire out and prevents re-ignition. "Simplex" Foam is stable and forms a protective coat for a considerable time after the fire is extinguished. In operation these Extinguishers discharge 16 gallons of fire killing foam impregnated with CO_2 which should be allowed to **fall** on the fire and should not be directed under pressure at the flames.

FIRE HOSE AND FIRE HYDRANT INSTALLATIONS.

For the supply of the famous brand of English "Underwriter" Hose, together with all Hydrant fittings.

Rubber-lined "Underwriter" Hose is available for use in Foam Installations or where it is desired to minimise water damage.

"Underwriter" Hose is tested to withstand 600 lb. pressure, and is noted for absence of leakage, absence of friction, durability and flexibility.

For the carrying out of complete Hydrant Installations and providing service for renewing hose and tying on couplings for existing installations.

Prices for above and all Extinguishers and Fire-Fighting Appliances on application—See Advertisement, Page 69.

ROOF TILER—SHINGLER

TERRA COTTA ROOFING TILES.

Terracotta roofing is by far the most popular roofing material used in Australia.

It is not advisable to have the pitch of the roof too flat, owing to the collection of dust and moisture which tends to discolour the tiles.

Sarking.—Although tiles are often laid without sarking, it is the practice, to ensure a completely watertight job, to cover the tops of rafters, before battens are fixed, with a reinforced waterproof building paper. For this purpose 30/30 grade "Sisalkraft," 19/6 S. & F., or 60/60 grade Sisalkraft, 22/- S. & F., is effective.

WEIGHT AND COVERING CAPACITY.

1,000 tiles weigh 3 tons, 4 cwt, 3 qrs.
One square requires approximately 131 tiles.
One square requires approximately 90 ft. battens.
1,000 tiles cover $7\frac{2}{3}$ squares.
One square rooftiles weighs approx. 9 cwts.

To avoid cut tiles and ensure the roof ending in a complete tile course the following rafter lengths should be adhered to.

RAFTER LENGTHS.
Terra Cotta Tiles.

Courses	Rafter ft.	in.	Courses	Rafter ft.	in.	Courses	Rafter ft.	in.
1	1	$1\frac{5}{8}$	9	10	$2\frac{5}{8}$	17	19	$3\frac{5}{8}$
2	2	$3\frac{1}{4}$	10	11	$4\frac{1}{2}$	18	20	$5\frac{7}{8}$
3	3	$4\frac{7}{8}$	11	12	$5\frac{7}{8}$	19	21	$6\frac{7}{8}$
4	4	$6\frac{1}{2}$	12	13	$7\frac{1}{2}$	20	22	$1\frac{1}{2}$
5	5	$8\frac{1}{2}$	13	14	$9\frac{1}{8}$	21	23	$10\frac{1}{8}$
6	6	$9\frac{3}{4}$	14	15	$10\frac{3}{4}$	22	24	$11\frac{3}{4}$
7	7	$11\frac{3}{8}$	15	17	$0\frac{3}{8}$	23	26	$1\frac{3}{4}$
8	9	1	16	18	2	24	27	3

MORTAR REQUIRED FOR 100 FEET OF RIDGING.

Bedding.—2 cubic feet of lime mortar.
Pointing.—1 cubic foot cement mortar and 2 lbs. red oxide.
Labour.—One tiler will bed 75 feet ridging per day.

METHOD FOR MEASURING.

If the roof is **plain and unbroken,** take the length of the longest eave, and multiply it by length of rafter, double for both sides of roof. Gables and hip roofs measure alike, but add extra for projection of gable; also extra for the cutting of hips.

For broken roofs of the same pitch throughout, reckon the whole area as one roof, and allow extra for cutting valleys, hips, and ridges.

In irregular pitched roofs measure the eaves in sections, and multiply by the different lengths of the rafter above each section.

Terra Cotta Roofing Tiles and Accessories fixed within the County of Cumberland except areas mentioned below.

Specifications.—1½″ x 1″ local timber battens, every second tile wired with brass or copper wire, not lighter than 20G, and not more than one storey high, and not less than 6 squares in area.

		Per 100 sq. ft. £	Square s.	d.
1.	All Terra Cotta Tiles, light or dark red, including salt stained, but which are unglazed and not manganese stained	6	12	10
2.	Glazed and semi-glazed red, brown or black or shades thereof, but excepting muntz or shades thereof ...	6	15	4
3.	Mottled roof of classes 1 and 2, including up to 25% muntz and/or shades thereof	6	18	4
4.	Mottled roof of classes 1 and 2, including up to 15 per cent. muntz or shades thereof, and up to 10 per cent. green and/or blue	7	0	4
5.	Mottled roof of classes 1 and 2, including up to 50 per cent. muntz or shades thereof	7	0	4
6.	Mottled roof of classes 1 and 2, including up to 40 per cent. muntz and up to 10 per cent. blue and/or green.	7	2	4
7.	Mottled roof of classes 1 and 2, including up to 100 per cent. muntz or shades thereof	7	4	10
8.	Mottled roof of classes 1 and 2, including up to 90 per cent. muntz or shades thereof with and up to 10 per cent. blue and/or green	7	7	4
9.	Nut green (not sprayed)	7	7	4
10.	Chocolate—manganese mixed in clay	7	5	4
11.	Mottled roof of classes 1 and 2, including up to 50 per cent. nut green (not sprayed)	7	2	4
12.	Multi coloured up to 30 per cent. muntz and up to 20 per cent. of sprayed green and/or blue in conjunction with classes 1 and 2	7	4	10
13.	Sprayed Tiles—full roof, all green and/or blue. ...	8	2	10

Jobs under 6 squares, 5/– per square extra.

Allow 5/– per square extra on schedule rates to jobs beyond a line drawn from Kuring-gai to corner of Schofields Road and Windsor Road, thence to Mt. Druitt, thence to Crossroads at Glenfield, thence to Bulli Pass Road, and in the area north by Queenscliff Bridges, and in a line to Bantry Bay, bounded on the west of Middle Harbour Creek and on the north by a line drawn due west from Powder Works Road, Narrabeen, to Cowan Creek.

Allow 7/6 per square extra on schedule rates to jobs beyond Bulli Pass Road to Wollongong and Pt. Kembla.

Also on all jobs beyond a line drawn from Campbelltown to the Nepean River, including Cobbitty, Camden, and also within an area of 10 miles beyond Campbelltown Post Office, including Appin and Menangle.

Ridging in this area at Country rates.

Also on all jobs in the area north of line drawn from Powder Works Road, Narrabeen, due west to Cowan Creek and bounded on the west side and north by Cowan Greek and Pittwater.

Also on all jobs from Windsor to Richmond and inclusive.

RIDGING AND ACCESSORIES EXTRA.

	s.	d.	
Plain Ridging	1	8¾	foot.
Multi Coloured Ridging	1	10¾	„
Sprayed Ridging—green or blue	2	0¾	„
Chocolate Ridging	1	10¾	„
Starters (not included in measurement of ridging) ...	3	0	each.
Sprayed and chocolate starters (not included in measurement of ridging)	3	3	„
Apex	3	9	„
Sprayed and Chocolate Apex	4	3	„
Gable Finial O.G.	7	9	„
Half-round Ridging, diminishing or otherwise ...	2	1¾	foot
Half-round Ridging, multi coloured	2	3¾	„
Sprayed Ridging, multi-coloured	2	5¾	„
Chocolate Ridging	2	3¾	„
Half-round Starters (not included in measurement of ridging)	5	8	„
Half-round Starters sprayed and chocolate (not included in measurement of ridging)	6	2	„
Half-round Apex diminishing or otherwise	5	8	„
Half-round Apex sprayed and chocolate, diminishing or otherwise	6	2	„
Roll Tile on the Verges—1 course	1	10	„
—2 course	3	5	„
Any departure from the standard specification will be subject to the following extras :—			
Tile Creasing—bedding shingle tile or shingle bricks on wall under roof tile and pointing up of same includes shingle half ridge tile or asbestos, including pointing (builder to provide mortar and cement)	2	0	„
Pointing Gables over Brickwork (builder to provide mortar and cement)	1	1	„
Screwing without bedding on to barge board, but pointing the bottom and top end of tiles where interlocking		7d.	„
Pointing only bottom end of tiles where interlocking ...		4d.	„
Battens—Local Timber, 2″ x 1″	3	9	sq.
Oregon or other Imported Timber—1½″ x 1″...	2	10	„
— 2″ x 1″...	6	4	„
Wiring Battens—1″ x 1″ Local Timber			
Every third course ...	3	11	„
Every second course ...	6	2	„
Whole Roof	11	1	„
1″ x 1″ Oregon or other Imported Timber			
Every third course ...	3	9	„
Every second course ...	6	0	„
Whole Roof	10	10	„

	s.	d.	
Every tile wired not lighter than 20 gauge	2	9	Sq.
3 storey work (3 floors)	2	11	,,
2 storey work (2 floors)	2	1	,,
Over 3 storey work, builder to hoist. See definition storey work below.			
Glass Tiles—Australian	6	0	each
Lacing Work—Including nails and wire	6	7	Sq.
1 ply Bituminous, 1st grade	28	0	,,
2 ply Bituminous, 1st grade	31	0	,,
3 ply Bituminous, 1st grade	35	0	,,
Saturated Felt No. 15	20	0	,,
Sisalkraft, 30/30	19	6	,,
60/60	22	0	,,
(Includes laying felt and lacing every tile, but no battens. No deduction for lesser wiring).			
Fixing the above roofing materials	2	3	,,
Steep Roof of 45 deg. and over	6	0	,,
Steep Roof of 45 deg. and over, 3 Storeys or over ...	12	0	,,
Steep Roof of 45 deg. and over, 3 storeys or over, sarked or felted	17	0	,,
45 deg. or over—Ridging		4d.	Feet.
Stripping old Roofs, Iron, Slates, Tiles or Shingles ...	6	0	Sq.
Bedding work on the parapet wall and chimney tops and shoulders (builder to supply mortar and cement) one course	2	6	Feet
Bedding work, do, between tiles at head of tiles on roof	6	0	Sq.
Supplying mortar, sand and cement for ridge bedding and/or pointing		5d.	per lineal Ft.

Storey Work: The first floor commences from the point where tiler can load tiles, providing delivery can be made within 30 ft. of building—each additional carry of 30 ft. or part thereof, 1/– per square extra. Churches, cinemas, grandstands or factories calculated as one storey up to 15 ft. above foundation, each additional 10 ft. or part thereof as an extra storey.

Cement and Mortar—Bellcast Battens: Builder or Proprietor to supply all cement and mortar, also ladders and scaffolding, and supply and fix Bellcast Battens.

Measurements: All jobs subject to measurement on completion, the squarage measurements to be taken from centre of ridge tile to gutter end of eave tile, and where valleys occur to the centre of valleys on each slope of the roof.

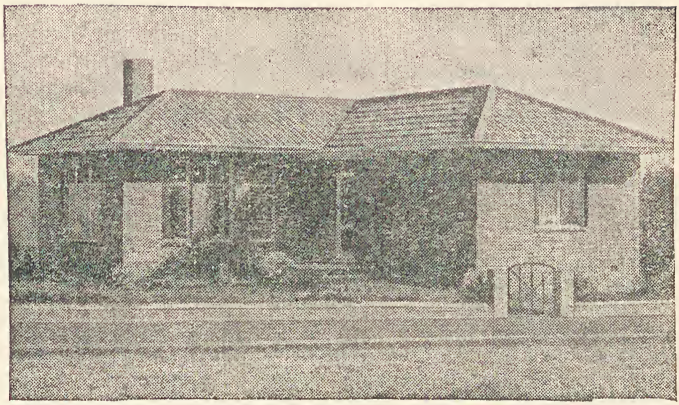
For quotes and service See Advertisement, Page 66.

SLATES AND BATTENS REQUIRED PER SQUARE.

Laid with a 2½ in. lap or cover.

	Wt. per 1000.	No. per sq.	Battens per sq.
Duchess, 24 x 12 ...	50 cwt.	120	120 ft. run
Countess, 20 x 10 ...	33⅜ ,,	180	150 ,,
Viscountess, 18 x 10 ...	30 ,,	208	175 ,,
Ladies, 16 x 8 ...	20⅞ ,,	300	200 ,,

METAL TILE ROOFING.



MINIMUM SIZES OF TIMBERING FOR METAL TILE ROOFING.

Rafters.—For unsupported length not exceeding 6′–0″ use 3″ x 2″ Hardwood at 3′–0″ centres. Oregon or other "D" class 4″ x 2″ at 3′–0″ centres.

Unsupported length not exceeding 8′–0″ H.W., Oregon or other "D" class timbers, 4″ x 2″.

Battens.—For rafter spacing not exceeding 3′–0″ Hardwood 2″ x 1½″ on flat, 3″ x 1″ at ridge hips and valleys. Oregon or other "D" class timbers use 2″ x 1½″ on edge with 3″ x 1½″ at ridge hips and valleys.

Screws.—Average 11 screws for each 5′–10½″ x 2′–11½″ sheet which is sufficient to fix sheeting and accessories.

Rafter Lengths.—Length of Rafter = No. of tile courses at 1′–3½″ + 2½″.

Where Fascia Board is omitted add 3½″ to No. of tile courses.

Net Sydney Retail Prices for Materials (Unfixed).

14/3	per 5′–10½″ x 2′–11½″ sheet (16 tiles to sheet). No. 1838.
9/6	per half sheet (8 tiles in row). No. 1839.
4/3	each for Hip Starter Sheets. L.H. No. 1840, R.H. No. 1841.
4/3	each for Valley Starter Sheets. R.H. No. 1842, L.H. No. 1843.
8/–	each 6′ length of Ridge and Hip Capping, No. 1844.
9/5	each 6′ length of Hip Starter. No. 1845.

Delivered Free in Metropolitan Area. Country Orders: Cases and Packing extra at cost, F.O.R. Sydney.

Covering capacity of 16 Tile Sheets.—7 Sheets will cover 100 sq. feet of roof.

Add Hip Starter Sheets and Valley Starter Sheets.

METAL TILE ROOFING.

Approximate Example of Cost—Per Square.
Unfixed.
Russet Red Synthetic Enamel Finish.

	£	s.	d.
7 Sheets at 14/3	4	19	9
77 Screws 1¾" and Washers at 10d. lb.		5	0
Nett Cost	£5	4	9

Add Hips and Ridges, 1/7 per foot.
Add Valleys, 1/10 per foot.
Add Lead Apex Pieces, 3/6 each.
Add Battens and Labour Fixing.

See Advertisement, Inside Front Cover.

CEMENT ROOF TILES.

Cement roof tiles are manufactured similar to terra-cotta roofing tiles.

The tiles should be subject to an absorption and pressure test and also a transverse breaking test, to ensure that the tiles have been correctly manufactured.

The average percentage of absorption of the tiles should not exceed 10 per cent.

These tiles can also be coloured with pigments incorporated during making or by an application of a suitable resinous roofing paint before fixing.

Tiles weigh 7½ to 8 lbs. each and from 123 to 131 per square of roofing are required.

Ridging, apex pieces and hip starters are made to match.

Rafter Lengths for these tiles need to be set out to allow for sufficient lap.

A sample of the tile is necessary to set out battens.

CEMENT TILES—FRENCH PATTERN.

Cost Per Square—Fixed.

	£	s.	d.
Tiles—Red or Mottled	4	15	6
Battens (including nails)		16	0
Labour Fixing (including Wire and Oxide)	1	5	0
Minimum Cartage of 5 miles		6	0
Nett Cost Tiles and Battens	£7	2	6

Contractor to supply Mortar and Cement.
Add Cartage beyond 5 miles—5d. per square per mile.
Add Ridging, 1/8 ; Fixing and Cartage 5 miles, 10d. = 2/6 per foot.
Add Starters, 5/- each fixed—Apex, 4/- each fixed.
Contractor to add mortar and profit.

EXAMPLE.

A Roof 13¼ squares with cartage 30 miles.	£	s.	d.
13¼ square at £7 2s. 6d.	94	8	6
100 ft. Ridging at 2/6 ft.	12	10	0
5 Starters	1	5	0
3 Apex Pieces		12	0
25 extra miles cartage at 5d.		10	6
Cost = £8 5s. 0d. per square—Nett Cost 13¼ squares ...	£109	6	0

SHINGLER.

Number of Shingles a good tradesman should lay per day of 8 hours :—

Redwood Shingles on a roof, 2,000.
Shingles on walls, 1,500.

Number of Shingles or Shingle Tiles.

Required to cover a square, stating average width of shingle and length exposed to weather, or width of rows seen.

Width of Rows seen. Inches	Width of Shingle. 4in.	6in.	1000 Shingles will cover ft. 4in. Shingle. sq. ft.	6in. Shingle. sq. ft.
4	900	600	110	168
5	725	485	140	210
6	605	405	167	250
7	515	345	195	292
8	451	306	225	335

Battens Required Per Square—Lineal Feet.

Metal Shingles 100 ft.—Slates 20 x 10—150 ft.
Redwood Shingles 190 ft.—Oak Shingles—210 ft.
Shingle Tiles—Terra-Cotta—190 ft. Tiles—French Pattern, 90 ft.

Forest Oak Shingles.

Forest Oak Shingles, 15″ x 3½″—8 Bundles to Square.

Cost—Per Square Fixed.

	£	s.	d.
800 Forest Oak Shingles at £5 per thousand	4	0	0
Battens 210 ft. at 17/- per 100 lin. ft.	1	15	9
Nails and Clouts...		5	0
Labour Fixing Shingles	2	10	0
Labour Fixing Battens		8	0
Minimum Cartage		1	3
16/3 Per Yard—Cost Per Square	£9	0	0

REDWOOD SHINGLES.

Redwood Shingles—4 Bundles Per Square.

Cost —Per Square Fixed.

	£	s.	d.
4 Bundles at 30/-	6	0	0
Battens 190 ft. at 17/-	1	12	0
Nails and Clouts		5	0
Labour Fixing Shingles	1	15	0
Labour Fixing Battens		7	0
Minimum Cartage		1	0
Nett Cost Per Square	£10	0	0

RUBBER PRODUCTS

AUSTRALIAN RUBBER FLOOR AND WALL COVERINGS.

Rubber: Ideal for wooden or suspended concrete floors. Manufactured in thicknesses of $\frac{1}{8}''$ for domestic use and $\frac{3}{16}''$ for utility and commercial use. Wide range of mottled and plain colours manufactured.

PRICES—PER SQUARE YARD—INCLUDING TAX.

Subject to 8⅓ per cent. Sales Tax on Material.

	Materials only.	Plus 8⅓ per cent. tax	Supplied & Fixed
Domestic Floors—$\frac{1}{8}''$ ...	25/–	27/1	39/7
Industrial Floors—$\frac{3}{16}''$ ...	35/–	38/–	50/6

Add 12/6 which includes labour and adhesion.

SEMTEX MASTIC TILES—TAX FREE.

Manufactured in squares 9″ x 9″ x $\frac{3}{16}''$. Variety of mottled colours available and most suitable on concrete floors, particularly basement areas. Suitable for areas where very heavy traffic is experienced, such as hotel floors, public buildings, etc.

PRICES—SUPPLY AND FIX.

Light Colours—52/– per square yard ... ...
Dark Colours—48/– per square yard ... ... } $\frac{3}{16}''$ thick
All Colours—38/– per square yard ... ... $\frac{1}{8}''$ thick

M Type Link Matting—13/6 per square foot, plus 8⅓ per cent. tax.
A Type Link Matting—10/– per square foot, plus 8⅓ per cent. tax.

Semtex Fleximer Underlay:—For levelling uneven floors, both wood and concrete, to take any floor covering.

$\frac{3}{16}''$ thick, 25/– per sq. yard fixed complete.
$\frac{1}{8}''$ thick, 12/6 per sq. yard fixed complete.

See Advertisement, Page 38a.

BRITISH RUBBER FLOORING (IMPORTED).

British Rubber Flooring is manufactured from the finest natural rubber and is of excellent quality. Obtainable in widths of 72″ and 36″ and in thicknesses of $\frac{1}{8}''$, $\frac{3}{16}''$ and $\frac{1}{4}''$. Available in a standard colour range of 36 colours; 10 plain and 26 marbled designs of colours or combination of colours.

Sponge Rubber Underlay is also obtainable in $\frac{1}{8}''$ or $\frac{1}{4}''$ thicknesses and in 36″ widths. This Underlay is used mainly for large City Buildings, Foyers, Hospitals or Doctors and Dentists Surgeries where added quietness and soft tread is essential. Stairways are also catered for as there is a range of 5 plain colours in Stair Nosings and the Treads and Rises and Landings are cut to the required shape and size from the Flooring.

The rubber flooring withstands heavy wear, is non-slip and shock absorbing, vermin and rot proof, easy to clean and the colours are permanent.

It can be easily laid on any type of floor base. The method of laying varies with the type of job and the kind of floor base on which it is laid.

FLOORING COSTS—APPROXIMATE.

Prices of the Rubber Flooring and Associate Lines are as follows :—

$\frac{1}{8}$" thick Rubber Flooring	47/9 per sq. yard
$\frac{3}{16}$" " " "	66/6 " " "
$\frac{1}{4}$" " " "	87/6 " " "

LABOUR LAYING.

8/– per sq. yard in the Metropolitan Area provided the floors are prepared for straight runs and varied prices according to the requirements such as Tiles and Design patterns.

Country Laying charges are based on the Metropolitan Figure plus travelling and accommodation expenses.

$\frac{1}{8}$" thick Sponge Underlay	3/6 Per sq. Foot
$\frac{1}{4}$" " " "	6/3 " " "
Fixing Compound £2 5s. 0d. per gallon. (a gallon covers approx. 12 sq. yds).	
Std. Stair Nosings	5/3 per ft. unfixed.

All the above prices include Sales Tax and are F.O.R. or F.O.B. Sydney.

Special discounts on above prices are given to contractors, retailers, etc.

A technical staff for free advice and quotes and trained rubbed floor layers are at your service. See Advertisement, Page 35a.

ROPES AND BLOCKS

FIBRE ROPES AND CORDAGE.

Fibre rope is manufactured in the various states of Australia and compares very favourably with rope from any part of the world.

When referring to fibre ropes the word " hemp " is loosely used, and does not indicate any particular type or quality of rope, but simply means that it is not a wire rope.

Rope is manufactured from hard fibre and soft fibre and consists of two groups. The hard fibre group includes Manila (from Philippine Islands), Sisal (from Java and British East Africa), New Zealand hemp, and Coir from coconut husks grown in India.

The soft fibre group is manufactured from American and Indian Cotton, Indian Jute, European hemp and Australian Flax from the linseed plant grown in Australia.

TYPES OF ROPE.

Three Strand Hawser Laid is mostly used in Australia for general utility work. It consists of three strands laid together.

Four Strand Shroud Laid is a rope of four strands laid around a smaller fifth strand known as the heart or core. This core eliminates the hollow which would otherwise result from the twisting of the four strands.

Cable Laid Rope consists of three completed three strand ropes, twisted together in the opposite direction to the original twist, forming one rope approximately three times the circumference of the smaller ropes. This type is more elastic and is referred to as a " spring."

Ropes are ordered by circumference and not by diameter so that a 3" rope would be less than an inch in diameter. Rope is sold by weight and not by length.

The quality of the rope required is important. The nature of the work the rope is intended to do should be mentioned so that the supplier will know the correct size and quality required for the work.

The following table shows the approximate weight and length of Coils of Manila, Sisal and New Zealand Hemp ropes, with the breaking strain of best pure Manila (ropes). One Fathom is equal to 6 feet.

Size	Weight			Length	Weight per 100 ft.			Breaking Strain	
Inches	Cwts.	Qrs.	Lbs.	Fathoms	Cwts.	Qrs.	Lbs.	Tons	Cwts.
½	0	0	12	180	0	0	1½	0	3
¾	0	0	20	180	0	0	2½	0	7
1	0	1	4	125	0	0	3½	0	10
1¼	0	1	20	125	0	0	5	0	12
1½	0	2	4	125	0	0	7	0	18
1¾	0	2	10	125	0	0	8	1	5
2	0	3	2	125	0	0	12	1	10
2¼	0	3	25	120	0	0	14	2	0
2½	1	0	17	120	0	0	17	2	10
2¾	1	1	16	120	0	0	20	3	0
3	1	2	25	120	0	0	26	3	10
3¼	1	3	20	120	0	1	0	—	—
3½	2	1	0	120	0	1	6	4	10
3¾	2	2	10	120	0	1	11	—	—
4	3	0	10	120	0	1	16	6	0
4¼	3	1	14	120	0	1	20	—	—
4½	3	2	18	120	0	1	27	8	0
4¾	4	0	18	120	0	2	10	—	—
5	4	3	10	120	0	2	14	9	10
5½	5	2	5	115	0	3	7	12	0
6	7	0	0	115	0	3	21	14	0
6½	7	3	5	115	1	0	10	16	10
7	9	2	0	115	1	1	0	18	10
7½	10	3	14	115	1	2	9	—	—
8	12	0	0	115	1	2	27	—	—
9	15	1	0	115	2	0	24	30	0

FIBRE AND STEEL WIRE ROPE.

Coir Rope is used for marine work and is noted for its elasticity and resistance to immersion in water. Lighter in weight than other hard fibre ropes and the breaking strain is much smaller.

Cotton Rope is used on small sailing craft and sometimes for power transmission drives.

Europe or Bolt Rope is used for rope ladders, ratlines on ships, and, being dressed with tar, is impervious to the effects of water.

Cable Laid Rope is used mainly in towing and, for this reason, only the larger sizes are manufactured. Most cable laid ropes are manufactured from Coir.

THE CARE OF ROPES.

Never use a rope to more than 20 per cent. of breaking strain.

Store rope always in a cool dry place with good air circulation and not subject to the direct rays of the sun.

Never store rope until thoroughly dry.

When storing rope, avoid contacting it with rusty metal which quickly deteriorates the rope.

Avoid dragging rope along the ground and over rough surfaces.

Use blocks and pulleys with sheaves large enough to give plenty of clearance.

To open a coil of new rope, lay flat on ground and cut the lacing but do not disturb the hessian covering. The uppermost flat surface must be the one where the end of the rope is seen and easily drawn out from above.

If the coil is wrong side up, kinking of the rope will result.

Costs—Sisal Rope.

Under one inch circumference—324/– per cwt.
One inch and over—313/– per cwt.

Approximate Weight of Coils of Coir Rope.

Size	Approximate Weight Per Coil			Approximate Weight Per 100 Feet.		
Inches	Cwts.	Qrs.	Lbs.	Cwts.	Qrs.	Lbs.
½	0	0	6	0	0	¾
¾	0	0	7	0	0	1⅓
1	0	0	19	0	0	2½
1¼	0	0	25	0	0	3¼
1½	0	1	2	0	0	4
1¾	0	1	9	0	0	5½
2	0	1	15	0	0	6¾
2¼	0	2	5	0	0	8½
2½	0	2	9	0	0	9
2¾	0	3	3	0	0	12
3	0	3	24	0	0	15
3½	1	0	25	0	0	19
4	1	3	4	0	1	0
4½	2	0	25	0	1	6
5	2	2	12	0	1	12
6	3	3	3	0	2	5
7	5	0	17	0	2	27
8	7	2	0	1	0	9
9	10	2	0	1	2	2

STRENGTH AND ALLOWABLE WORKING LOADS OF STEEL WIRE ROPES.

The following table shows the breaking strains of plough steel, 100/110 tons per sq. inch, wire ropes.

STEEL WIRE ROPES OF AUSTRALIAN MANUFACTURE.
Weight and Breaking Strains of Best Plough 100/110 Ton Steel Wire.

Rope Sizes.		Weights in lbs. per 100 ft.				Guaranteed Breaking Strains in tons of 2240 lbs.			
Circ. in Inches	Diam. in Inches	6 x 7 Semi Flexible	6 x 19 Flexible	6 x 24 Extra Flexible	6 x 37 Special Extra Flexible	6 x 7 Semi Flexible	6 x 19 Flexible	6 x 24 Extra Flexible	6 x 37 Special Extra Flexible
1	$\frac{5}{16}$	19	18	16	18	4·2	3·4	3·0	3·5
$1\frac{1}{4}$	—	27	25	24	25	6·2	5·2	5·0	4·8
$1\frac{1}{2}$	—	40	36	33	36	9·0	7·4	7·0	7·1
$1\frac{5}{8}$	$\frac{1}{2}$	47	43	39	43	10·5	9·0	8·1	8·4
$1\frac{3}{4}$	$\frac{9}{16}$	54	50	47	50	12·3	10·1	9·3	9·9
2	$\frac{5}{8}$	72	66	60	66	16·2	13·7	12·7	13·2
$2\frac{1}{4}$	—	87	84	78	84	20·0	17·2	15·8	17·0
$2\frac{1}{2}$	$\frac{13}{16}$	107	102	95	102	24·8	21·1	20·1	20·1
$2\frac{3}{4}$	$\frac{7}{8}$	132	123	113	123	30·7	25·3	23·9	24·7
3	$\frac{15}{16}$	154	154	134	145	36·0	31·9	28·1	29·8
$3\frac{1}{8}$	1	168	168	148	159	38·7	33·9	30·3	32·4
$3\frac{1}{2}$	$1\frac{1}{8}$	217	217	188	198	49·3	43·8	38·7	39·7
$3\frac{3}{4}$	—	247	247	213	230	56·7	49·9	43·9	46·0
4	—	275	275	239	263	63·6	56·3	50·9	52·9
$4\frac{1}{2}$	—	350	350	312	333	81·0	71·8	63·2	65·9
$4\frac{3}{4}$	$1\frac{1}{2}$	392	392	344	369	90·4	79·5	71·6	74·1
5	—	—	420	378	409	—	87·6	78·7	82·6
$5\frac{1}{2}$	$1\frac{3}{4}$	—	523	450	493	—	106·7	93·8	98·8
6	—	—	626	527	590	—	127·7	112·3	119·0

Commercial ropes are also made in the following qualities for which the breaking strains are quoted as a percentage of the 100/110 ton rope list shown.

Black Best Patent (80/90 tons sq. ins.)...	...	80 per cent.
Galvanised Hawser (80/95 tons sq. ins.)	...	85 „ „
Black Special Patent (90/100 tons sq. ins.)	...	90 „ „
Special Plough (110/120 tons sq. ins.) ...	...	110 „ „

Other special qualities are available in both black and galvanised wire for mining, aircraft work, etc.

When ropes are fitted with an independent wire rope core (I.W.R.C.) add 10 per cent. to the weight of rope shown and 7½ per cent. to the list breaking strains.

Factors of Safety.

To allow for reasonable wear, shock loads, etc., and the necessary degree of safety to plant and personnel, the breaking strain of the rope used should be divided by the Factor of Safety quoted to provide the allowable working load on the rope.

Factor of Safety.

For Cranes (Hook Hoist, Grab Hoist, Derrick Fall and Boom Lines)	6
For Service Winch or Block Ropes	6
For Shovels and Excavating Equipment ...	... 5 to 6 min.
For Derrick Crane Guys	5
For logging Skylines, Main Cableways	4
For Logging Spar Tree Guys and Stack Guys	3 to 4
For Incline Haulages	6 to 8

LOAD CALCULATIONS.

In many applications, e.g., incline haulages, drag scrapers, etc., it is difficult to estimate the load due to bearing, and rope friction, and other variables on the rope. In such cases, particularly where electrical drives are used, it is possible to get the horsepower absorbed by the drive and the speed of travel.

$$\textbf{Maximum Rope Load in Pounds} = \frac{1{\cdot}5 \times \text{H.P.} \times 33000}{V}$$

1·5 = The live load factor providing for sudden starting loads.
H.P. = The Horse Power used on the drive.
33000 = One Horse Power Unit in ft. lbs. per min.
V = Rope Speed in ft. per min.

Inclined Rope Haulage.

For a quick estimate of the breaking strain of an incline rope the following formula gives a good guide to rope size and weight to allow for a closer mathematical calculation of the rope loading where required.

Rope Breaking Strain = Gross Load on Rope × Factor of Safety × Rate of gradient.

A. **Gross Load** = Weight of carried load, **plus** weight of rope and attachment **plus** weight of skip or skips.

B. **Factor of Safety** = As required, subject to existing regulations.

C. **Rate of Gradient** = Actual figure, say, 1 in 6.

Example: If A. = 8 tons, ,, B. = 8 to 1, ,, C. = 1 in 6 $\Big\} = 8 \times \frac{8}{1} \times \frac{1}{6} = \frac{64}{6}$

= 10·67 tons as the rope strength required to haul 8 tons up an incline of 1 in 6 with a factor of safety of 8 to 1.

Loading on Block Rope Falls.

The maximum load on the running end of the fall in a rope block system may be calculated from the following formula :—

$$P = \frac{W}{N \times E}$$

Where P = Maximum load on Running End of the fall.
W = Total Load hoisted in pounds.
N = Number of Rope returns on the running block.
E = Efficiency Factor given in the table below (Based on the use of blocks in average working condition and ropes of suitable construction).

No. of Rope Returns on Running Block	Efficiency Factor for Plain Bearings	Efficiency Factor for Roller Bearings.
2	·88	·94
3	·84	·92
4	·81	·90
5	·78	·89
6	·75	·87
7	·72	·86
8	·69	·84

These figures should be used when the running end of the fall is attached to the drum of the winch directly. For lead blocks used to change the direction of the fall between block and winch, deduct 8 per cent. for each plain bearing sheave, and 4 per cent. for each roller bearing sheave. Rope Blocks should be kept in good repair and well lubricated.

ROPE RECOMMENDATIONS.

The range of service covered by steel wire ropes in industry is too broad to cover comprehensively in the compass of these short notes but the following general recommendations will provide a good working basis for economical rope service.

Rope Terms Used.

R.H.O.L. or O.L.—Right Hand Ordinary Lay.
R.H.L.L. or L.L.—Right Hand Langs Lay.
L.H.L.—Left Hand Lay (as for drilling).
L.L.T.L.—Langs Lay Preformed.
I.W.R.C.—Independent Wire Rope Core.
B.100—Basic Plough Steel (100/110 tons sq. in.).
A.110—Acid Special Plough Steel (110/120 tons sq. in.).
G.B.90—Galvanised Basic Steel (80/95 tons sq. in.).

LOGGING.

Tractor Winch Ropes.
$\frac{1}{2}$″ to $1\frac{1}{8}$″ dia.—6 x 9/9/1, B.100, R.H.O.L., Preformed (Fit with I.W.R.C. for heavy duty).
$1\frac{1}{8}$″ to $1\frac{1}{4}$″ dia.—6 x 10/5/5/1 B.100 and A.110, R.H.O.L., Preformed with I.W.R.C.

Yard Winch Ropes.
$\frac{1}{2}$″ to $\frac{3}{4}$″ dia.—6 x 9/9/1 B.100, R.H.O.L.
$1\frac{1}{2}$″ cir. to 2″ cir.—6 x 24 G.B. 90, R.H.O.L.

Log Carriage Ropes.
$\frac{1}{2}$″ to $\frac{5}{8}$″ dia.—6 x 9/9/1 or 6 x 10/5/5/1 B.100 L.L. Preformed.
$\frac{3}{4}$″ to 1″ dia.—6 x 19 Filler Wire B.100 L.L. Preformed.

Earthmoving and Excavating Equipment.
Bulldozers, Rooters, Scraper Carryalls etc.:
$\frac{1}{2}$″ to $\frac{3}{4}$″ dia.—6 x 19 Warrington B.100 L.L. Preformed with I.W.R.C.
$\frac{13}{16}$″ and $\frac{7}{8}$″ dia.—6 x 19 Filler Wire B.100 L.L.T.L. with I.W.R.C.

Power Shovel Main Hoist and Boom Ropes.
$\frac{1}{2}$″ to $\frac{3}{4}$″ dia.—6 x 9/9/1 A110/120 R.H.O.L. Preformed with I.W.R.C.
$\frac{7}{8}$″ to $1\frac{3}{8}$″ dia.—6 x 19 Filler A110/120 R.H.L.L. Preformed with I.W.R.C.
$1\frac{1}{2}$″ dia. and upwards—6 x 41 A110/120 R.H.L.L. Preformed with I.W.R.C.

Boom Guy Ropes.
1″ to $1\frac{3}{4}$″ dia.—6 x 19 Warrington B.100 or A.110 R.H.O.L. with I.W.R.C.

Trip Ropes.
1″ to $1\frac{1}{4}$″ cir.—8 x 19 B.100, R.H.O.L. Preformed or 6 x 19 and 6 x 24 G.B. 90, R.H.O.L. Preformed.

Crowd and Retract Ropes.
$\frac{3}{4}$″ to 1″ dia.—6 x 37 Seale A.110, L.L.T.L. with I.W.R.C.
$\frac{1}{2}$″ to $\frac{5}{8}$″ dia.—6 x 19 Warrington B.100 L.L.T.L. with I.W.R.C.

Dragline Ropes.
$\frac{5}{8}$″ to $1\frac{1}{4}$″ dia.—6 x 9/9/1 A.110 L.L. Preformed with I.W.R.C.
$1\frac{1}{4}$″ dia. and upwards—6 x 10/5/5/1 A.110 L.L. Preformed with I.W.R.C.

General Erection Ropes—Lightly Loaded Contractors' Winches.
1″ to 2″ cir.—6 x 19 or 6 x 24 G.B. 90 R.H.O.L.

Derrick Cranes.
$\frac{1}{2}$″ to $\frac{3}{4}$″ dia.—6 x 19 or 24 G.B. 90, R.H.O.L.
$\frac{3}{4}$″ to $1\frac{1}{8}$″ dia.—6 x 37 Seale or 6 x 37 R.H.O.L. Preformed.

Winches with Small Drums and Bad Leads.
$\frac{1}{2}$″ to $\frac{7}{8}$″ dia.—6 x 9/9/1 or 6 x 10/5/5/1, B.100 R.H.O.L.

Crane Ropes: Small Electric Hoists.
$\frac{1}{2}$″ to $\frac{7}{8}$″ cir.—6 x 19 G.B. 90, R.H.O.L.
1″ to $1\frac{1}{4}$″ cir.—8 x 19 G.B. 90 or B.100 R.H.O.L.

Workshop Cranes.
$1\frac{1}{2}$″ to $2\frac{1}{4}$″ cir.—6 x 26 Warriflex B.100 R.H.O.L. for small drums and sheaves.
$1\frac{1}{2}$″ to $2\frac{1}{4}$″ cir.—6 x 24 G.B. 90 R.H.O.L.

Heavy Cranes.
$2\frac{1}{4}$″ cir. and upwards—6 x 37 (18/12/6/1) B.100 R.H.O.L.
Where conditions are abrasive use 6 x 37 (15/15/6/1). Seale R.H.O.L. Preformed.

Transporter Cranes and Grabs.
$\frac{5}{8}$″ to 1″ dia.—6 x 19 Filler Wire R.H.O.L. Preformed B.100 ropes.

Drilling Ropes.
$\frac{9}{16}$″ to $\frac{3}{4}$″ dia.—6 x 19 Warrington L.H.L. B. 100 (for water bores)
6 x 24 G.B. 90 L.H.L.

Cable Drilling.
$\frac{5}{8}$″ to $\frac{3}{4}$″ dia.—6 x 9/9/1
$\frac{3}{4}$″ to $\frac{7}{8}$″ dia.—6 x 10/5/5/1
$\frac{7}{8}$″ to 1″ dia.—6 x 19 Warrington
} L.H.L. B.100.

Rotary Drilling Lines.
$\frac{7}{8}$″ to $1\frac{1}{8}$″ dia.—6 x 9/9/1 with I.W.R.C.—R.H.L. B. 100.

Sand Lines.
$\frac{5}{16}$″ to $\frac{13}{32}$″ dia.—6 x 7 B.100 or G.B. 90 R.H.O.L. Preformed.
$\frac{13}{32}$″ to $\frac{1}{2}$″ dia.—6 x 9/9/1 B.100 or G.B. 90, R.H.O.L. Preformed.

Casing Lines.
$\frac{3}{4}$″ to 1″ dia.—6 x 19 Warrington B.100 R.H.O.L.

SHEAVES AND DRUMS.

Small sheaves and drums with bad fitting grooves are responsible for considerable rope abuse and care should be taken to check and true up sheave and drum grooving regularly particularly before fitting new ropes, if reasonable rope life is to be obtained.

The compactness of much modern rope using equipment has resulted in the use of very small sheaves and drums which produce heavy bending stresses and compression loads in the rope, and where possible the sheave sizes shown below should be used. The " critical " sheave size is accepted by ropemakers as being that below which long economical rope life cannot be expected.

SHEAVE AND DRUM DIAMETERS.

D = Diameter of the rope in inches.

Rope Constructions.	Recommended Sheave Diameter.	Minimum Working Diameter.	Critical Diameters.
6 x 7 (6/1) ...	72 D	42 D	28 D
6 x 9/9/1 Seale ...	54 D	34 D	22 D
6 x 19 Warrington	48 D	27 D	20 D
6 x 19 Filler Wire	45 D	24 D	18 D
6 x 19 (12/6/1) ...	45 D	24 D	18 D
6 x 24 (15/9/J) ...	36 D	22 D	16 D
6 x 37 (18/12/6/1)	30 D	19 D	14 D
6 x 37 Seale ...	30 D	19 D	14 D
6 x 37 Filler, 6 x 41 ...	27 D	18 D	14 D
8 x 9/9/1 ...	36 D	22 D	16 D
6 x 7/3 Flattened	72 D	42 D	28 D
6 x 12/12/3 „ Strand	48 D	32 D	21 D

SHEAVE GROOVE SIZES.

Rope Diameter Inches.	Groove Diameter Tolerances. Minimum	Maximum
$\frac{1}{4}$″ to $\frac{5}{16}$″ dia.	$+\frac{1}{64}$″	$+\frac{1}{32}$″
$\frac{3}{8}$″ to $\frac{3}{4}$″ dia.	$+\frac{1}{32}$″	$+\frac{1}{16}$″
$\frac{13}{16}$″ to $1\frac{1}{8}$″ dia.	$+\frac{3}{64}$″	$+\frac{3}{32}$″
$1\frac{3}{16}$″ to $1\frac{1}{2}$″ dia.	$+\frac{1}{16}$″	$+\frac{1}{8}$″
$1\frac{9}{16}$″ to $2\frac{1}{4}$″ dia.	$+\frac{3}{32}$″	$+\frac{3}{16}$″
$2\frac{5}{16}$″ and larger	$+\frac{1}{8}$″	$+\frac{1}{4}$″

Example: Groove diameter for 1″ diameter rope should be $1″ + \frac{3}{64}″$ minimum and $1″ + \frac{3}{32}″$ maximum.

Sheave bushings or bearings should be inspected regularly and replaced when necessary. Check the alignment of the sheaves with drums and eliminate bad leads, such as bars and fixed plates.

DESCRIPTION AND ORDERING OF WIRE ROPES.

With the ever increasing use of mechanical equipment fitted with steel wire rope in all industries greater attention should be paid to the ordering and choice of the correct rope for any service or equipment, and when in doubt the following rope characteristics should be provided to the ropemaker.

	Description of Rope.	Example
1.	**Dimensions**: (a) Length	3,000 ft.
	(b) Circumference or diameter ...	$3\frac{1}{8}$″ circ.
2.	**Construction**: Number of strands	6
	Number of Wires per Strand	x 19
	Arrangement of wires in each strand ...	9/9/1
	Lay: Direction and Type	R.H.O.L.
	Core: Steel or Hemp	Hemp
	Kind of Fabrication	Preformed
3.	**Grade**: Quality of Steel (Acid or Basic) ...	Basic
	Tensile Strength of Wire	Best Plough or 100/110 t.s.i.
4.	**Lubrication**: Petroleum Jelly, Graphite, etc. ...	Graphite
5.	**Service**: Type of Equipment on which rope is to be used.	Caterpillar Logging Winch

POINTS IN ROPE USAGE.

1. Where conditions are very abrasive use the coarsest rope construction compatible with reasonable flexibility over the sheaves and drums used and in plough steel or special plough steel wire. Such ropes should be preformed to provide maximum safe rope life.

2. Where the rope can be anchored at both ends to prevent rotation of the load Langs Laid ropes are more capable of withstanding increased wear and bending life than Ordinary Lay Ropes. To make them foolproof in handling, particularly when fitted with an I.W.R.C., these ropes also should be preformed.

3. Use ropes fitted with an I.W.R.C. when they are subjected to heavy loading over small sheaves and drums e.g., all earthmoving and excavating equipment ropes require an I.W.R.C.

4. When working conditions are corrosive or are not conducive to ready and regular maintenance use galvanised wire ropes.

BLACK PLOUGH STEEL WIRE ROPES.

Circ. in Inches	6 x 7 Langs Lay—for Haulage, etc.			6 x 19 { 12·6·1 / 9·9·1 / 6·6·6·1 For Logging, Shovels, etc.			6 x 24 Extra Flexible—for Cranes, Hoists, etc.			6 x 37 Special Extra Flexible—for Cranes, Lifting Tackle, etc.		
	Price Per Cwt.	lb. Per 100 ft.	Breaking Strain (tons)	Price Per Cwt.	lb. Per 100 ft.	Breaking Strain (tons)	Price Per Cwt.	lb. Per 100 ft.	Breaking Strain (tons)	Price Per Cwt.	lb. Per 100 ft.	Breaking Strain (tons)
1	91/–	19·0	4·2	166/9	18·0	3·4	226/9	16·0	3·0			
1¼	81/6	27·0	6·2	130/–	25·0	5·2	171/3	24·0	5·0			
1⅜	81/6	34·0	7·7	130/–	30·0	6·1	150/6	28·0	5·9			
1½	75/3	40·0	9·0	113/–	36·0	7·4	134/6	33·0	7·0			
1⅝	75/3	47·0	10·5	103/3	43·0	9·0	134/6	39·0	8·1			
1¾	71/3	54·0	12·3	103/3	50·0	10·1	117/6	47·0	9·3			
2	68/3	72·0	16·2	92/–	66·0	13·7	108/–	60·0	12·7	117/6	66·0	13·2
2¼	65/6	87·0	20·0	85/6	84·0	17·2	96/6	78·0	15·8	108/–	84·0	17·0
2⅜	65/6	97·0	22·6	85/6	92·0	19·4	96/6	86·0	17·4	108/–	92·0	18·0
2½	64/3	107·0	24·8	84/6	102·0	21·1	90/3	95·0	20·1	108/–	102·0	20·1
2¾	62/6	132·0	30·7	84/6	123·0	25·3	90/3	113·0	23·9	96/6	123·0	24·7
3	62/–	154·0	36·0	78/6	154·0	31·9	89/–	134·0	28·1	90/3	145·0	29·8
3⅛	63/3	168·0	38·7	78/6	168·0	33·9	89/–	148·0	30·3	90/3	159·0	32·4
3¼	62/6	184·0	42·3	75/3	184·0	37·1	89/–	159·0	33·8	90/3	172·0	33·8
3½	63/–	217·0	49·3	75/3	217·0	43·8	83/–	188·0	38·7	89/–	198·0	39·7

GALVANISED STEEL WIRE ROPES.

Circ. in Inches	Dia. in Inches	6 x 7 M.S. Rigging 50/60 tons		6 x 19 Flexible—for Hoists, Fishing, etc.		6 x 24 Extra Flexible—for Slings, Cranes, etc.		6 x 37 Special Extra Flexible—for Hawsers, Cranes, etc.	
		Price Per Cwt.	lb. Per 100 ft.	Price Per Cwt.	lb. Per 100 ft.	Price Per Cwt.	lb. Per 100 ft.	Price Per Cwt.	lb. Per 100 ft.
$\frac{3}{8}$	$\frac{1}{8}$		2·2	619/3	2·9				
$\frac{1}{2}$	$\frac{5}{32}$		4·0	484/6	4·0				
$\frac{5}{8}$	$\frac{3}{16}$	156/6	6·3	320/–	6·3				
$\frac{3}{4}$	$\frac{1}{4}$	137/3	9·0	229/3	9·0	314/–			
1	$\frac{5}{16}$	98/9	18·0	126/3	18·0	162/–	16·0		
$1\frac{1}{4}$		85/–	25·0	108/9	25·0	130/9	24·0		
$1\frac{3}{8}$	$\frac{7}{16}$	85/–	30·0	108/9	30·0	130/9	28·0		
$1\frac{1}{2}$		82/9	36·0	100/3	36·0	111/3	33·0		
$1\frac{5}{8}$	$\frac{1}{2}$	82/9	43·0	92/9	43·0	111/3	39·0		
$1\frac{3}{4}$	$\frac{9}{16}$	80/9	50·0	92/9	50·0	100/3	47·0		
2	$\frac{5}{8}$	75/9	66·0	85/–	66·0	92/–	60·0	107/6	66·0
$2\frac{1}{4}$		65/9	84·0	80/6	84·0	86/6	78·0	99/3	84·0
$2\frac{3}{8}$	$\frac{3}{4}$	65/9	92·0	80/6	92·0	86/6	86·0	99/3	92·0
$2\frac{1}{2}$	$\frac{13}{16}$	64/3	102·0	75/3	102·0	81/–	95·0	99/3	102·0
$2\frac{3}{4}$	$\frac{7}{8}$	63/–	123·0	75/3	123·0	81/–	113·0	85/3	123·0
3	$\frac{15}{16}$	63/–	145·0	71/–	145·0	77/3	134·0	79/6	145·0
$3\frac{1}{8}$	1	62/–	159·0	71/–	159·0	77/3	148·0	79/6	159·0
$3\frac{1}{4}$		61/6	172·0	68/6	172·0	77/3	159·0	79/6	172·0
$3\frac{1}{2}$	$1\frac{1}{8}$	60/3	198·0	68/6	198·0	73/–	188·0	74/–	198·0

For further information See Advertisement, Page 46b.

WALL TILING
PORCELAIN ENAMEL PANELS

TILER—FLOORS AND WALLS.

Wall and Floor Tiles are made in Great Britain and the Continent, and are also manufactured in Australia in small quantities. The Australian manufacturer has combined the making of Floor Tiles and sanitary-ware as one project, whereas the English manufacturer principally makes wall tiles.

Recently a new Australian manufacturer has commenced making wall tiles principally and production should be sufficient to cover the full demand of Australia later.

Both wall and floor tiles are noted for their pleasant appearance, cleanliness and hygienic finish.

Tiles are made for different types of work, such as the following:—

Pastel Shades 4 x 4 and 6 x 6 for bathrooms and rooms where cleanliness and attractive decoration is required. Glazed tiles 6 x 6 and 4 x 4 for jobs that require constant cleaning, such as Toilets, amenity sections in Factories, Butcher Shops, Swimming Pools.

Tiles of a Fireclay body, 4 x 4 and 6 x 6 in various colours, fire-resistant, suitable for fireplace surrounds.

Glazed Tiles 16″ x 8″ commonly known as Aggot Tylaglass for very expensive and decorative bathrooms of a large area.

Unglazed Tiles, which are commonly known as a Vitreous Floor Tile, used principally for paving the floors of Bathrooms, Verandahs, Vestibules, Kitchens, etc. These tiles are made in various sizes ranging from $\frac{3}{4}$″ square which are known as square Ceramics up to as large a size as 6 x 6.

Moravian Tiles. Although not vitreous, are extensively used for covering Bathroom, Toilet and Verandah floors, and are of various colours. These are popular tiles for domestic uses and give a very charming effect.

Tiles principally used, both in walls and floors range—

(a) For walls 4 x 4 to 6 x 6.
(b) For floors 2 x 1 to 6 x 6.

Tiling Terms Used—Wall Tiles.

6″ x 1″ Inlay band for decoration.

6″ x 2″ Round Edge tile for finish on top as a decoration.

6″ x 1″ Angle Beads for external corners.

6″ x 1″ Sparrow Beaks which are the intersection of a bead on the top and a bead down an external corner.

6″ x $1\frac{1}{4}$″ Internal Cove tiles used in the internal angles and as a cove to the floor.

Inner Tops are the intersection of the internal cove corner with the Round Edge finish on the top.

External bonding tiles are for forming the round on an external corner combined with the size of the tile being fixed on the wall.

Body Round Edge used in 6 x 6 or 4 x 4 is an expression of the Round Edge Tile which can finish on the top and on the external corner.

Round Edge return is the top section meeting the side Round edge on an external corner.
Short Round Edge : describes the round on an external corner at the short end of a decorative strip.

Sand and Cement proportions.

Sand and Cement is used in the proportions of 3 of sand and one of cement and varies according to the nature of the wall. It varies from 2 to 1 to 4 to 1.

One bag of cement mixed 3 to 1 will lay approx. 5 sq. yds. tiling.

NUMBER OF TILES PER SQUARE YARD.

Size	6 x 6	4 x 4	3 x 3	2 x 1	4 x 3	6 x 2	6 x 1	16 x 18 Slab
Number	36	81	144	648	72	108	216	10

INTERIOR WALLS.

Nett Cost—Labour and Materials Complete—Per Square Yard—Includes Sand and Cement.

Description	Size	Cost	Labour Laying	Nett Cost
		s. d.	s. d.	s. d.
Colours ...	4″ x 4″	45 0	18 6	63 6
,, ...	6″ x 6″	40 6	16 6	57 0
Cream Glazed ...	6″ x 6″	30 6	16 6	47 0

In storey work builder to deposit tiles where fixed.
Add oncosts and profit.

EXTERIOR WALLS.

Nett Cost—Labour and Materials—Per Square Yard.

Description	Size	Cost	Labour Laying	Nett Cost
		s. d.	s. d.	s. d.
Colours ...	6″ x 6″	40 6	16 6	57 0
Cream ...	6″ x 6″	30 6	16 6	47 0

Add Scaffold, oncosts and profit.
Decorative Strips 1/3 per foot run extra.
Plain Strips 1/– per foot run extra.
Cappings, Angle Beads, 1/6 per foot run extra.

PATHS AND FLOORS—Per Square Yard.

Description	Size	Cost	Labour Laying	Nett Cost.
		s. d.	s. d.	s. d.
Moravian ...	2″ x 1″	25 6	16 6	42 0
,, ...	2″ x 2″	26 6	16 6	43 0
Vitreous ...	2″ x 2″	35 0	16 6	51 6
,, ...	4″ x 4″	35 0	16 6	51 6
Mosaic ...	¾″ x ¾″	41 0	16 6	57 6

RECESSO ACCESSORIES.

	£ s. d.	
Soap Holder with Grip—6″ x 6″	1 5 0	Each
,, ,, ,, ,, 6″ x 3″	17 6	,,
,, ,, ,, ,, 4″ x 4″	17 6	,,
,, ,, without grip 6″ x 6″	1 2 6	,,
Tooth Brush and Tumbler Holder	1 2 6	,,
Robe Hooks	15 0	,,
Gargoyles (water mixer)	1 7 6	,,
Ventilators	8 0	,,
Toilet Paper Holders	1 5 0	,,
Towel Rail Ends (with Glass or Chrome rod) ...	1 15 0	per pair
Shower Curtain Ends (Chrome Plated)	10 0	,, ,,
Shaving Cabinet (with mirror) complete	5 0 0	each
Tile Fireplaces—Ready made (Supply and Fix) ...	£25 to £40	each

For Quotes See Advertisement, Pages 32 and 42b.

ASPHALT FLOOR TILES—AUSTRALIAN.

Asphalt floor tiles are manufactured from practically indestructible materials, asphalt, asbestos, plastic resins, mineral filler and colour pigments, consequently are extremely durable and resistant to moisture and hard wear.

A wide range of 14 marbleized colours ensures colourful and picturesque patterns to suit all types of floor design. The colour and veining penetrates the full thickness, so that wear and tear does not dim the pattern in any way. The natural resilience makes it non-slippery and comfortable to walk upon. Suitable for internal floor coverings in offices, factories, hallways, vestibules, theatre entrances, restaurants and homes. Manufactured in thicknesses ⅛″ and $\frac{3}{16}$″, and in sizes 9″ x 9″ and 12″ x 12″.

The method of laying is important and the manufacturers or approved distributors readily give quotes for particular jobs laid complete because prices vary according to colour, design, thickness of tile, underlay and condition of sub-floor etc.

Approximate Prices—Laid Complete.

Locally Manufactured Tiles—

⅛″ Asphalt Tiles 25/- to 35/- per sq. yard

$\frac{3}{16}$″ ,, ,, 35/- to 47/6 ,, ,, ,,

GRIPTILES.

Griptiles are individual tiles 6″ x 6″ (not tile sheets) manufactured from styrene, a chemical inert compound not affected by any acid or alkali in ordinary use. Being also waterproof they are particularly suitable for bathrooms, shower recesses, kitchens, laundries, toilets, etc.

Griptiles can be fixed on any flat wall surface—asbestos cement, masonite, plywood, brick, plaster, cement etc.

They are ideal for timber framed buildings. Any structural movement in timber framed buildings is absorbed by a special Gripfix compound used in fixing.

The back of the tile has raised cross ribs for added strength, and they are fitted with undercut grips which bed into the mastic to hold the tile permanently in position. The griptile is an improvement on a similar styrene tile which has become standard practice in America.

Method of fixing.

The ready-to-use Gripfix compound is applied evenly and not too thickly on the back of the tile. The tile is then pressed into position on the wall. No special tools or skill are needed and any cutting is easily done by scoring the surface with a file or glass cutter and breaking along the weakened surface.

Manufactured in all colours—Price 39/6 per sq. yard.

Gripfix compound.—5 to 6 sq. yards per gallon—Price 39/6 per gallon.

For Supplies See Advertisement, Page 40b.

PORCELAIN ENAMEL PANELS.

Vitreous Porcelain Enamel consists of a hard durable glass coating, fused to a sheet metal base at a firing temperature of 1560° to 1620° Fahrenheit.

Manufactured in a variety of permanent colours.

The shop front panels are fabricated from 18 gauge steel in panel sizes up to 24″ x 18″, with ¾ inch returned edges. Fixing clips are spot welded to the flanges to ensure easy fixing.

Method of Fixing.

The building face is panelled out with 3″ x 1″ battens plugged to walls. The centres of battens correspond, both horizontally and vertically, with the size of porcelain panels.

The corner sheet is screwed firmly in position to battens. The lugs on one end of the panels are slid under the fixed panel and the fixing clips at other end of panel are screwed to the next batten and so on. This method of fixing hides all screws and lugs, leaving the finished work free from any evidence of fixing. The joints are ⅛″ in width and are filled and sealed with Vulcatex putty to ensure a weatherproof joint.

Approximate Prices—Ex Factory—

Plain Panels from 12/6 per square foot.

Curved Panels and Sections from 16/6 per sq. foot.

The panels may be fixed by carpenter on job. For further information, advice and current prices—

See Advertisement, Page 46a.

SANITATION

SEPTIC TANKS.

Inside the tanks are fittings arranged to control the scum, which is formed upon the surface of the liquor in the tank by the bacteria, and which is of the utmost importance to the efficient working of the system. The bacteria utilised is that known as *Bacilli Coli Communis*, together with another species known as *liquifaciens*. This scum formation has a twofold purpose. First, it is used by the bacilli to hermetically seal up the inside of the tank, as oxygen is fatal to their existence. Secondly, it forms the culture upon which the colonies thrive. It is therefore of the utmost importance in the design that no part of the tank should interrupt the unbroken formation of this scum, and that no inrush or outflow should cause an agitation or crack of the scum.

After the sewage, in a broken state, passes into the tank, large numbers of the *colonies* in a very rapid progress pass from the scum down through the liquor and immediately break up all the organic compounds, reducing them to their original elements, and the colonies then return to the scum.

The liquor which passes from the tank is then quite clear, but contains cellulous and other putrefactive substances, such as albuminoids in solution.

It is then further treated in special patent bacteria beds, consisting of distributors and a pebble media to increase the working surface.

After the bacteria beds have been working for a short period there is formed on the surface of each pebble a coating of shiny growth. When dried it forms a stiff jelly containing masses of bacteria which rapidly absorb all the oxygen. It is this function that is used in the bacteria beds to procure the excellent effluent which is obtained, and the bacteria which you observe from the above, while they are the same species as cultured in the tank, thrive in the presence of oxygen in a different state, viz., *aerobic*. As the effluent from the tank passes over the jelly growth on the stones, the putrefactive substances held in solution are subtracted, and the water left entirely free from any matter that will prove putrefactive even under incubation at a high temperature for long periods.

The result is that waste water is produced in which gold and silver fish are said to thrive without showing any sluggishness in their movements. This is admitted to be the highest scientific test to which any effluent could be submitted.

To ensure the proper working of the installation, the discharge of the W.C., the house and kitchen slops, bath and laundry water, should all pass through the same. A too-concentrated or too-diluted sewage are all unsuitable.

Disinfectant must be strictly excluded. Only *sanitary paper* should be used in the W.C.

The size of the drain pipe leading to and from the septic tank, we would recommend 6 in. drain pipes for the former and 4 in. for the latter. Care must be taken that nothing passes into the drain pipes larger than is permitted by the gratings provided at the gullies, also that the latter be cleaned out periodically.

Rain water from roads and surface drainage from yards, &c., must be excluded from entering tank, and a *grease trap* installed to intercept fatty matter till cooled ready for removal at frequent intervals.

General Points.

The most suitable position for septic installations compatible with local conditions must be selected to enable the discharge of the effluent. If the ground has a slope, the installation should be arranged so as to discharge the effluent at the surface of the ground, where it may run into surface drains to soak into the soil or be used for irrigation purposes. If the ground be **flat**, the installation must necessarily be underground and the effluent must be discharged into underground drains of **rubble** or **perforated pipes** to soak into the sub-soil or to be collected into a tank if required for irrigation purposes, in which latter case the liquid will have to be lifted by mechanical means to the surface of the ground. In metropolitan areas the local council must be notified of proposed septic tank installation. A minimum distance of 15 feet from dwellings must be observed for installation.

Septic tanks will usually operate after about three weeks from installation but if difficulty is encountered some bacterial matter from another septic tank is introduced to speed the process.

The installation of a septic tank for closet wastes only is not recommended. At least one other class of waste, such as a bath waste, should be included. A laundry waste is suitable, but if a kitchen waste is used it must pass through a grease trap which must be cleaned regularly.

Domestic Septic Tank.

The design shown is a minimum size septic tank having a capacity of 130 gallons and is suitable for 6 persons. The design comprises a liquefying chamber, screening chamber, aerating chamber, vertical air cavity and an air chamber, situated between perforated slab under aerating medium and floor of aerating chamber.

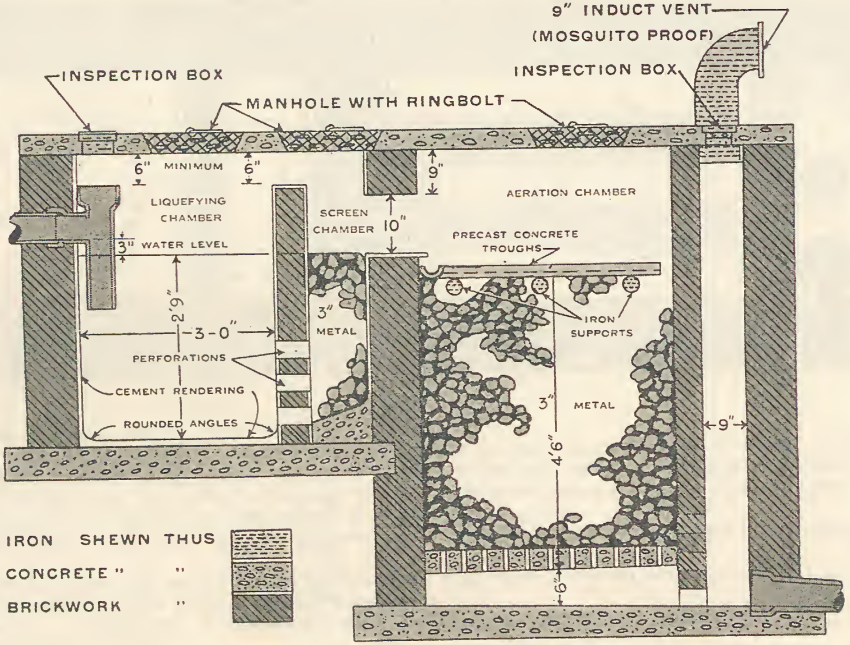
The floor of screening chamber must be graded to prevent the accumulation of sludge. The walls may be 9″ Brick in cement and rendered. If concrete walls are used they must be 6″ thick. The dimensions of aerating chamber should be such as to allow 1 square yard of surface area for every 200 gallons of sewage per day with a depth not less than 4′ 6″ of 3″ gauge hard stone or similar material.

The table of sizes below gives an indication of the sizes necessary for each type of septic tank according to the number of persons and in general it can be said that the liquefying chamber requires $3\frac{1}{2}$ cubic feet or 22 gallons capacity (measured below the water line) for each person. The sizes shown may thus be varied so long as the cubical contents still remain the same.

TABLE OF SIZES AND NUMBER OF PERSONS.
Internal Dimensions.

Length of Liquefying Chamber	Depth of Liquefying Chamber	Internal Width of Tank	Length of Aeration Chamber	Depth of Aeration Chamber	No. of Persons
3′–0″	2′–9″	2′–4″	4′–0″	4′–6″	6
3′–6″	2′–9″	2′–6″	4′–0″	4′–6″	8
4′–9″	3′–0″	3′–0″	5′–0″	4′–6″	14
6′–0″	3′–6″	3′–0″	6′–0″	4′–6″	20
6′–6″	3′–6″	4′–0″	7′–0″	4′–6″	30
7′–9″	4′–0″	4′–0″	9′–0″	4′–6″	40

STANDARD SEPTIC TANK



SECTIONAL ELEVATION

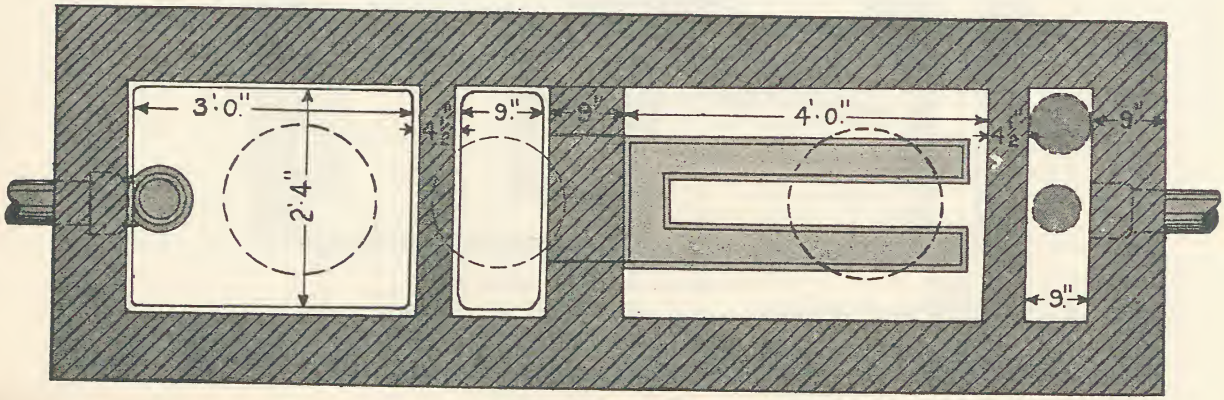
Perforated Slab, 4″ thick with 1″ holes at bottom of Aeration Chamber.
Concrete Bases to be 6″ thick.
Concrete Cover, 4″ thick, Cast in 2 sections with Manholes and Inspection Boxes.
Precast Distributing Troughs to be 4″ internal diameter.
Air Duct to be 9″ wide—Air Vent to be 9″ Induct Vent with Mica Flap and made Mosquito-proof with brass gauze.

The perforated slab can be precast on a flat board frame, $\frac{1}{4}$″ less than opening size and lowered when set with ropes threaded through perforations and pulled out when set on bed.

A cut brick in each corner and one in centre of each side wall is sufficient for the bedding of slab.

Drive a nail through from back of board projecting $\frac{1}{4}$″ on concrete side at each perforation. Press the 1″ dowel (an old broom handle cut in lengths will do) on to nail to hold in position while pouring concrete. Pull these out gently when concrete is nearly set.

SEPTIC TANK



HORIZONTAL SECTION

DOMESTIC SEPTIC TANK—6 PERSONS—EXCAVATION IN SOIL

Approximate Quantities and Cost—Bricks, 5 miles cartage.

	£	s.	d.
Excavation in Soil 12 cub. yds. at £1 3s. 0d.	13	16	0
Brickwork—1900 Commons at 200/- per thous.	19	0	0
Cartage, 5 miles at 27/- per thous.	2	11	4
10 bags cement at 8/8	4	6	8
2 Loads Sand at 12/-	1	4	0
Labour Laying 1900 Bricks at £8 per thous.	15	4	0
Concrete Floor Bases—1 cub. yd. at £6 per cub. yd.	6	0	0
Cement Render to Walls—9 sq. yds. at 6/-	2	14	0
Perforated Concrete Slab 4″ thick—1 sq. yd. at £1½ sq. yd. ...	1	10	0
Concrete Cover—with Manholes—5 sq. yds. at £1¾ sq. yd. ...	8	15	0
Precast Concrete Troughs—8½ lin. ft. at 3/6 per ft.	1	10	0
Blue Metal (3″) Packing—2 cu. yds. at £1½ cu. yd.	3	0	0
Labour—Packing Metal in Chamber	1	0	0
One 4″ Square Junction at 8/- each		8	0
Two 4″ Inlet and Outlet Pipes at 5/6 each		11	0
Three Ring Bolts at 2/6 each		7	6
Two Cast Iron Inspection Boxes at 7/6 each		15	0
One Mica-Flap inlet vent cowl at 10/- each		10	0
Mosquito Gauze to inlet vent		2	0
Nett Cost in Soil	£83	4	6

Adjust cartage over 5 miles—Add Profit.

Note.—Two 9 x 6 Terra-cotta vents may be set at end of tank in brickwork to replace Inlet vent, if covered inside with mosquito proof gauze.

A 4″ Asbestos cement vent-pipe with cowl is required, inserted in pipe line from house and must be included if complete estimate is required — See " Asbestos Cement " for cost.

HUME SEPTIC TANKS—COUNTRY INSTALLATION WHERE NO FILTER BED REQUIRED.

General instructions for Installing.

Before using Septic Tank, fill it to the required level with water.

Disinfectants or any other foreign matter **must not be allowed to enter Septic Tank.**

W.C.—The Closet Building should be put in good repair. The Flush Board and Cistern Board must be fixed securely to wall to take the Cistern and flush pipe. Cistern to be securely screwed to Cistern Board. Connect flush pipe to Cistern brass outlet with solder joint and to the horn of the pan with lead cone and putty packing. Flush pipe to be attached with clips to Flush Board, or any other desired mode of fixing.

Fasten the Pedestal Pan securely to floor and fix seat with brass bolts supplied with the Pedestal.

Connect ½″ water pipes, or where low pressure ¾″ water pipes, to the cistern with ½″ Union Stop Cock.

A Bitumen Joint must be made in connecting pan to the 4″ Drain Pipe.

The 4″ Drain Pipe from the W.C. to the Septic Tank must be laid in a straight line (or lines) with an even minimum fall of 1 foot in 40 feet and the top of the pipes should be bedded on solid ground and the joints made water-tight with cement compo—2 sand to 1 cement.

The trench for drain pipes should be excavated about 2 feet wide and the bottom trimmed evenly to the required grade, so that the pipes can be laid on the solid ground to the proper grade.

Next to the W.C., a slope Junction is laid in the line with the junction up and to the Junction is connected a 45 deg. Bend. From this Bend the Educt Vent is carried up and attached to the wall. The higher the vent is carried the better.

Between the W.C. and Tank an Inspection Pipe must be placed with the Junction covered with a disc and sealed to allow easy access to it in case of a blockage. One Inspection Opening is required to every 30 ft. of drain pipe.

The Septic Tank must be set true and level—this is tested with a spirit level on the cover.

The ground should be excavated and the bottom trimmed so that the Tank will set perfectly level, if possible lay a small quantity of sand in bottom of excavation. The refilling of excavation must be carefully consolidated.

The 4″ Inlet and Outlet Pipes, also the 4″ Induct Vent, are fixed in Tank with cement compo, in order to make secure and water-tight joints.

The Effluent or Distribution Pipes are laid from the outlet pipe of the Septic Tank, with a regular fall of about 1 in 100. The pipes will be 4″ agricultural or concrete pipes, butted close without jointing, and laid in a straight line on an even bed. The joints of these pipes are usually surrounded with broken stone.

If the soil is heavy a greater length of effluent pipes are necessary and they should be entirely surrounded with broken stone and a hole cut at the end of the pipes about 3 ft. in diameter and 3 ft. deep, to assist the soakage.

In non-absorbent soil it is necessary to excavate a hole down to a porous strata and if this is unobtainable the effluent must be allowed to run away on the surface, preferably over ploughed or broken ground. Where the effluent is disposed of on the surface some vegetation may be provided to absorb the effluent.

Approximate Prices.

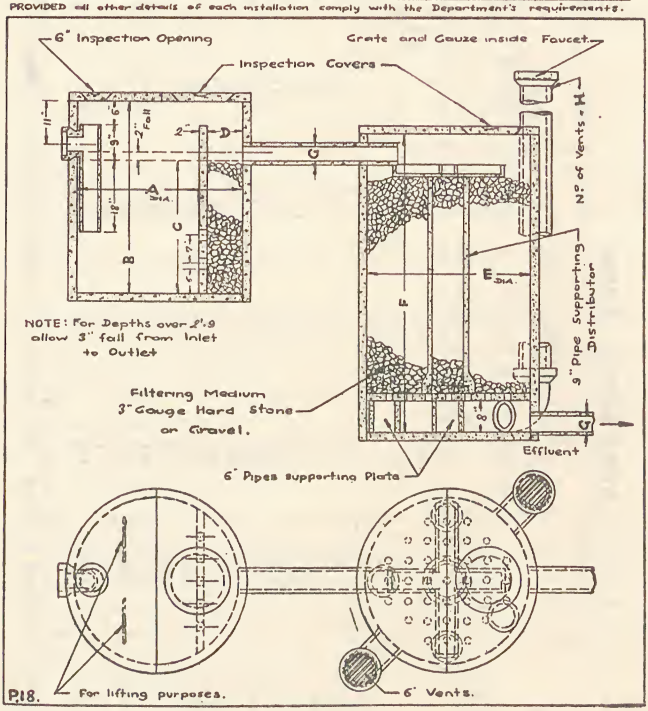
Type.	Capacity	Weight	Price
C 1	90 Gallons	·85 tons	£15 0 0
C 2	128 Gallons	1·2 tons	£18 10 0

For further information See Advertisement, Page 10.

Minimum Length of Effluent Pipes.

For Sandy Soil	...	...	... 80 feet.
For Heavy Soil	...	...	... 320 feet.

HUME SEPTIC TANK AND FILTERS.



The Hume septic tank is circular in construction, manufactured in various sizes to suit any number of persons. It is a self contained unit and once it is installed it operates without further cost.

In the metropolitan area filters are necessary but in the country the septic tank alone is sufficient and may be installed by any handy man. If desired, however, the local plumber can be called in to install.

In the following tables the capacity in gallons is given as a guide to the size of filter required for different size of tank. This is based on the fact that 1 sq. yard area of filter is required for every 200 gallons capacity of septic tank.

HUME SEPTIC TANKS.

Type	Diam.	Depth B	Gallons Capacity	Domestic Rating			Office Rating	Casual Rating	Approx. Price.
				2 wastes	3 wastes	4 wastes			
				Number of Gallons			Person	Day	
				10	15	20	6	3	
				Number of Persons.					£ s. d.
H.T.1	42″	48″	x138	13	9	6	23	46	14 19 0
H.T.2	42″	60″	x184	18	12	9	30	61	16 15 0
H.T.3	42″	72″	x234	23	15	11	37	78	18 11 0
H.T.4	48″	48″	x186	18	12	9	31	62	19 6 0
H.T.5	48″	60″	x249	24	16	12	41	83	20 2 0
H.T.6	48″	72″	x317	31	21	15	52	105	20 7 0
H.T.7	54″	60″	x322	32	21	16	53	107	24 17 0
H.T.8	54″	72″	x411	41	27	20	68	137	28 7 0
H.T.9	54″	84″	500	50	33	25	83	166	30 11 0
H.T.12	60″	72″	x516	51	34	25	86	172	36 1 0
H.T.14	60″	96″	692	69	46	34	115	230	37 1 0
H.T.15	72″	72″	x712	71	47	35	118	257	38 4 0
H.T.17	72″	96″	995	99	66	49	165	331	42 10 0

Preferred sizes marked " x " as filter is same diameter as tank.

FILTERS.

Type	Diam.	Depth	Area in sq. yds.	Gallons Capacity	Approx. Price £ s. d.
H.F.1	42″	75″	1·07	214	18 11 0
H.F.2	48″	75″	1·4	280	20 11 0
H.F.3	54″	75″	1·77	354	24 0 0
H.F.4	60″	75″	2·18	436	37 0 0
H.F.5	72″	75″	3·14	628	48 10 0

Example :—H.T.1 Type Tank, 138 Gallons Capacity, requires H.F.1 Type Filter, 1·07 square yards filter area.

For larger capacities, two or more filters to be provided as the case may require.

For further information See Advertisement, Page 10.

SANITARY CHEMICAL CLOSET—FOR UNSEWERED AREAS.

This sanitary closet of moderate cost is effective in killing odours, is fly repellant, kills germs and needs no water supply. It consists of a chemically charged lid working automatically with an operational cost of approximately 6d. per week. It is manufactured in two models. One model is the complete outfit ready to place over council's sanitary pans. The second model consists of the sani-lid only, ready to screw or bolt on to existing lavatory.

Sani-Lid Model No. 1 is a portable outfit which is simply placed on the floor in the ordinary closet house, covering the pan. It is fitted with solid cedar seat, to which is attached the " Sani-Lid " Automatic Chemical Container which feeds a small quantity of " Sani-Lid " fluid into the pan each time the lid is opened and closed. This chemical in conjunction with " Sani-Lid " Powder, which is placed in the empty pan, assists to dissolve the sewage matter, kills germs, and absolutely destroys all foul odours, and flies will not go near it.

Model No. 1, Sani-Lid Closet, complete with 2 tins Sani-Lid Powder and Funnel, 1 tin Sani-Lid Liquid, 2 rolls Sanitary Paper, Paper Holder (without pan), £5 17s. 6d.

Special Heavy Galvanized Pans to Council dimensions, fitted with 2 Lifting Handles, each 17/6

Additional Supplies of Chemicals :

" Sani-Lid " Fluid, concentrated 20 oz. Bottle makes one gallon, 6/9 per bottle.

" Sani-Lid " Powder (containers supplied), 24 oz. tin, 4/6.

Add Freight and Packing.

Sani-Lid Model No. 2.—Hinged Lid complete with chromium plated automatic feeder ready to bolt on to existing lavatory, together with 6 months' supply of operational chemicals. Price, £4 0s. 0d.—Add Freight and Packing.

For further information See Advertisement, Page 22.

THE HYGEIA DISSOLVENATOR.

The "Hygeia Dissolvenator" is a chemical sanitary system, complete in itself and displaces closet pans and ensuing sanitary rates.

The dissolvenator treats the matter scientifically, transforming the sewage matter into a sterile liquid to overflow into sump.

It is odourless and does not attract flies.

Septic tanks are unsuitable where they have spasmodic use, such as holiday resorts, whereas the dissolvenator may be left unused for any period and then put into full use immediately without any trouble arising. It requires little water, no flushing and can be installed by any handyman.

Operation.—The movement of the lid spins the cone around, presenting a surface above the level of the solution to intercept the excrement and prevent any possibility of splashing. When the lid is lowered the cone spins around, carrying the excrement down into the tank, where agitation, aided by the Dissolvent, turns it into a solution, an equivalent volume of which is displaced by the fresh matter and automatically runs off over the weir into the sump and so down into the soil. The level of the contents is always maintained at the level of the weir and the tank does not require emptying. The Dissolvent neutralises the excrement and urine and prevents corrosion. The sump is below ground and the effluent soaks away **without** harming vegetation.

Maintenance.—In the first place, about 12 gallons of fresh water are poured in through the bowl and the first charge of 7½ lbs. Dissolvent is dropped in. A small quantity of the Dissolvent is dropped in **each** week, according to the use made of the machine. This is based on the number of people regularly using it—about ½ lb. for each adult.

Cost of Running.—In most areas the Council charge for emptying pans is not enforced where Dissolvenators are used. The amount saved in most instances more than covers the cost of the weekly charge of Dissolvent. The Dissolvent costs approximately 1/2 per pound in N.S.W., i.e., 7d. per week per adult, and the special paper used costs no more than ordinary paper. There is no other expense—no disinfectants, deodorants or sanitary service.

Suitable for unsewered areas, factories, camps, aerodromes, hospitals, homes, guest houses, mines, etc. Manufactured in two sizes.

Approximate Prices.

Family Size (10 persons), £21 0s. 0d.
Double Capacity, £26 5s. 0d.
Crating if required, 16/- and 21/- extra.
Dissolvent, £1 9s. 0d. per 28 lb. drum.

For advice and current prices See Advertisement, Page 45a.

TREATMENT OF EFFLUENT WATER.

ABSORPTION TRENCHES.

A simple method of disposal is by means of absorption trenches.

To ensure the efficiency of the scheme, care must be taken to exclude roof water and so far as possible surface drainage.

The house drainage system should be laid, trapped and ventilated, as it would be in the case of drainage being connected to a sewer.

The provision of an efficient grease trap near the kitchen and its satisfactory maintenance are two important factors, otherwise the greasy water will cause chokage in the drain pipes and in the trench.

The absorption trench should be 2 feet in width and 2 ft. 6 in. in depth, and its lay-out should be across the fall of the land.

The length of the trench is dependent on the absorbing quality of the soil together with the daily maximum quantity of sullage water to be disposed of, but should be not less than 20 feet.

The trench should be packed with 3-inch broken hard stone to a height of 1 ft. 6 in., over which a line of agricultural pipes should be laid along the centre of the trench commencing about 12 inches from the beginning of the trench and thereafter running the full length of the trench. The drain pipe conveying the sullage water to the trench should extend into the trench and butt against the first agricultural pipe.

The joints of the pipes in the trench must not be sealed.

The pipes should then be surrounded and covered with 3-inch broken hard stone to within a few inches from the top of the trench, over which should be placed a protective covering of old iron, bags, bark or the like, before covering the trench with soil or turf.

In certain cases, it may be found necessary to provide a shallow sump at the far end of the trench for the purpose of collecting the overflow or seepage and to dispose of it by bailing or pumping it on to broken up and cultivated land, such as a garden plot.

The planting of moisture-absorbing trees, shrubs, or other vegetation in the vicinity of the trench will assist in the absorption of the sullage water, but care should be taken that the roots of the trees, etc., are not likely to interfere with the efficiency of the trench.

It has been found advisable to provide a permanent mark at both ends and change of direction of the trench, in order that the lay-out of the trench may quickly be located in the event of its being necessary to uncover or to extend the trench.

Example of Cost—20 feet run of trench.
2 feet wide by 2′ 6″ deep.

	£	s.	d.
Excavation 3⅔ cub. yds at 22/–	4	0	8
20 ft. run agricultural pipes 4″ at 91/8 per 100 ft. ...		18	4
3″ Blue Metal—3 cub. yds. at £1 10s. 0d.	4	10	0
Labour Packing Metal, etc., £1 5s. 0d.	1	5	0
Cost 10/9 per foot of trench—Cost 20 ft. run	£10	14	0

AIR CONDITIONING AND REFRIGERATION

INDUSTRIAL AIR CONDITIONING.

Motives for air conditioning are, primarily, to provide comfortable atmospheric surroundings or to benefit a product or process or, in some cases, both.

Industrial air conditioning is mainly concerned with producing or controlling atmospheric effects indoors for the specific benefit of a manufacturing process and the final product, or the preservation of material, equipment and commodities.

Again, as in the case of comfort air conditioning, the four atmospheric effects dealt with are temperature, humidity, air movement and quality. Unlike comfort air conditioning, where an attempt is made to control all four conditions, an industrial air conditioning application may or may not be concerned with such complete control of conditions, e.g., temperature control only in a beer or milk storage; humidity control only in a textile mill; temperature, humidity and quality (dust free air) control in a precision manufacturing plant; temperature, humidity, air movement and quality control in a sausage drying room.

Frequently, where humidity control is a major consideration, temperature control is incorporated, maintained at as reasonably comfortable levels as the product or process requirements will permit, for benefit of workers. This is out of consideration for increased productive efficiency and improved industrial relations attendant upon the health, comfort and well being of the workers. Examples are textile mills, paper manufacturing and printing plants where maintaining proper humidities for the benefit of the product, without attempt to control temperature during peak summer hot weather, frequently can result in almost unbearable working surroundings.

Also, quite often industrial air conditioning merges into the comfort category where manufacturing plants are air conditioned solely for the comfort of the worker out of recognition that handsome dividends may be returned as a result of increased worker efficiency, reduction of fatigue, less labour turn-over and absenteeism, better health and improved employer–employee relations. Examples are automobile assembly lines, aircraft assembly plants and plants or processes that build up excessive internal heat load as a by-product (from motors, gas flames, etc.) to an extent that working conditions without air conditioning are almost unbearable.

Conditions to be Maintained.

Obviously, temperature and humidity conditions required to be maintained vary widely with the nature of the process and characteristics of the product. Relative humidities ranging from low to high are encountered; 10 or 12 per cent. for a particular process used in the manufacture of laminated non-breakable glass, 85 per cent. in a cotton cloth weaving room. The same cotton materials, however, are subject to considerably lower humidities (50 to 60 per cent.) in the earlier stages of processing, e.g., the carding and picking room, the spinning rooms where the cotton is spun into thread. Pharmaceutical powders frequently must be processed in rooms held at comparatively low relative humidities, 20 per cent. to 30 per cent. Static electricity is under control around 50 per cent. relative humidity or higher, bakery dough rooms are held at 65 per cent., and so on.

Temperatures may vary over the widest ranges from –130°F. for aircraft engine testing, to extremely high temperatures 300° to 400°F. for drying processes.

With such wide variations of atmospheric conditions required for the many products and processes for which industrial air conditioning is applied, it is beyond the scope of this discussion to attempt to classify these and specify, within narrow limits, optimum conditions desired in the manufacture or handling of such.

General Classification.

Industrial air conditioning applications may be grouped under six classifications :—

1. Control of regain.
2. Control of rate of chemical reaction.
3. Control of rate of bio-chemical reaction.
4. Control of rate of crystallisation.
5. Atmospheric control to aid precision manufacturing.
6. Elimination of static electricity.

Air conditioning for comfort is mentioned as the seventh classification, since it does tie in with industrial air conditioning in the manner previously described.

1. Control of Regain.

Materials having a vegetable or animal origin such as paper, wood, textiles, leather, tobacco, foodstuffs and to a lesser extent minerals—in certain forms are known to be hygroscopic. This means that the material has the quantity of absorbing or releasing water vapour from or to the surrounding atmosphere according to the existing relation between the moisture content of the material and the relative humidity of the atmosphere. These materials are considered hygroscopic in which this characteristic is sufficiently marked to cause measureable physical changes in weight, dimensions, strength, etc.

Each hygroscopic material has the quality of absorbing from the atmosphere a definite quantity of moisture relative to its weight at any given relative humidity. The moisture it absorbs, expressed as a percentage of its bone-dry weight, is termed regain. The per cent. regain of a given material at any time depends mainly on the relative humidity of the air to which it has been exposed. The effects of temperature are comparatively unimportant.

The physical characteristics of a material change with regain variations as the fibres expand and contract with the increasing and decreasing of their moisture content. For example, these effects will cause sheets of paper to stretch, shrink, curl and wave as relative humidity of the surrounding air changes, causing a change in the paper's regain. This results in the Printing Industry's " headache " of mis-register, particularly prevalent in plants doing multi-colour work where the relative humidity has changed between press runs, causing colours on the second run to overlap, or fail to meet the colours on the third run.

Regain markedly affects the physical properties of textiles changing the strength, pliability and elasticity of the fibres.

Manufacturers of products that are sold by weight to a trade-established standard of regain, or of products, the physical products of which affect their sales values and cost of manufacture through production efficiency variations, are naturally vitally concerned with regain and its possible and practical control to specified tolerances with air conditioning. Textile products are typical examples of such. In fact, air conditioning got its start many years ago in the Textile Industry, and is considered indispensable to that industry.

In dealing with products that are hygroscopic, it is generally agreed that relative humidities of 50 per cent. or less are on the dry side. Such conditions are conducive to low regains, drying out, increased brittleness of the fibres, increased static electricity and tendencies towards the dust liberation from the product. Relative humidities higher than 50 per cent. are considered to be on the damp side and promote high regain, softness and pliability of the material, less static electricity and reduction of product dust.

During the process of manufacture, products may be dried to a lower moisture content to establish a desired regain or to regulate their physical properties.

Some products in the final process of manufacture require a closely controlled drying cycle. Two specific examples are smoke sausage drying and gut string drying. Here the primary problem is one of controlling the drying at some specific rate. The rate of drying is affected by air velocity over the product and the wet bulb depression. Air velocity effects are usually reduced to a minimum by elaborate precautions in distributing the air to eliminate drafts. The rate of moisture pick-up from the product is then governed by the wet bulb depression which is the difference between the dry and the wet bulb. This is because temperature of the surface of the moist product approaches the wet bulb temperature. Hence, the moisture present on the surface has a vapour pressure corresponding to this temperature, and one is appreciably lower than the room air vapour pressure corresponding to its dew point. The rate of moisture evaporation may be accelerated or retarded during the drying cycle by increasing or decreasing the wet bulb depression.

If drying of the surface is too rapid, case hardening sets in which in the case of sausage will cause mould at the centres. On the other hand if the moisture leaves the centre of the product at a greater rate than it leaves the surface, a discolouring slime forms on the surface. The remedy for both conditions is close control of temperature and wet bulb depression at values established by experience for the specific product in question, values which will vary with different size, shape and composition of the product.

2. Control of Rate of Chemical Reactions.

A typical example in this case of industrial air conditioning is the drying of varnish which is an oxidizing, and therefore a chemical, process dependant on the temperature and relative humidity. High humidities (about 65 per cent.) retard the rate of oxidization at the surface and allow the internal gases to escape freely as the chemical oxidizers cure the varnish from within. This produces a surface free from bubbles.

3. Control of Rate of Biochemical Reactions.

All applications involving fermentation are classified under this heading, where the rate of reaction is controlled by surrounding air temperature, and the process is frequently aided by control of humidity. Bakery dough rooms, brewery fermentation cellars, curing of fruit (bananas) and tobacco processing are a few of many examples.

4. Control of Rate of Crystallisation.

The rate of cooling of a saturated solution determines the size of the crystals formed. Both dry and wet bulb temperatures are of importance as the one controls the rate of cooling, while the other, through evaporation, changes the density of the solution. Sugar coatings for candy, gum and pills are subject to air blown over the coatings in the proper amount and at the correct dry and wet bulb temperatures to control the rate of crystallisation and give a smooth, opaque covering for the end product.

5. Atmospheric Control to Aid Precision Manufacturing.

The metal working industry in working to micrometric tolerances of ten-thousandths of an inch frequently finds close control of atmospheric temperature essential to eliminate dimension changes caused by expansion and contraction of metals through small temperature variation. Ultra-precision gauges calibrated by the Gauge Manufacturer at 72°F. should be used in a plant held at the same temperature to ensure measurements to original accuracy of calibration.

Plants in which parts machined to highly polished surfaces, for instance ball bearing plants, are handled by the workers should be maintained at lower relative humidities (40 per cent. or less) to prevent sweat forming on the workers' hands and in turn corroding or etching the polished metal surfaces, and also to prevent moisture condensation of the parts causing rust. Air cleanliness is important in such plants, requiring effective air filtering to prevent gritty dust settling on the parts and scratching the surfaces.

6. Elimination of Static Electricity.

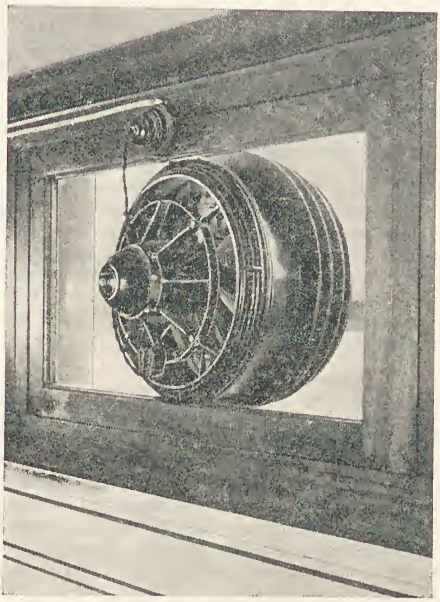
The presence of static electricity frequently causes production difficulties in the processing of light materials such as paper and textiles, where electric charges cause the materials to adhere to one another or attract foreign particles. In cases where the explosive atmospheres or inflammable materials are present, sparks from static electricity discharges can be extremely hazardous.

It has usually been found that static electricity ceases to be a problem if the surrounding air is maintained at approximately 50 per cent. relative humidity or higher.

For advice and quotes on air conditioning See Advertisement, Page 27.

Domestic Refrigerators—See Advertisement, Page 41b.

VENT-AXIA UNIT



VENT-AXIA VENTILATION.

The Vent-Axia ventilating unit may be obtained in two types :— Extract and Intake units. They may be used separately or as a combination of both according to the nature of the ventilating problem.

If the main object is to remove smoke from a small room or public bar, or cooking odours from a kitchen, the extract unit will give the best result. When the purpose is to cool an over-heated atmosphere, say, in an office, the intake unit will give the best result.

The units are manufactured in three sizes and are easily inserted in a circular hole cut in existing walls, partitions, and glass and leadlight windows, etc.

The Silent Six :—Handles 8,000 cubic feet of air per hour (226 cub. metres) and weighs 6 lbs.—Price, £11 8s. 9d.

The Silent Nine :—Handles 20,000 cubic feet (566 cub. metres) per hour and weighs $9\frac{3}{4}$ lbs.—Price each, £20 2s. 4d.

Industrial Twelve :—Handles 40,000 cubic feet (1,132 cubic metres) per hour and weighs 14 lbs.—Price, each, £26 7s. 5d.

It will be seen from above, that, in a room of 10′ x 10′ x 8′ = 800 cubic feet, the Silent Six, handling 8,000 cubic feet per hour would give 10 complete air changes per hour (A.C.H.).

Under normal conditions, the following recommendations of Air changes per hour may be found useful in estimating the size of units or units required.

	Air changes per hour.
Chemical laboratories and rooms with noxious fumes	30 or more
Laundries and Bakeries	20—30
Kitchens (small)	15—20
Kitchens (large), lavatories, bathrooms and restaurants (small)	10—15
Bars, Smokerooms and Clubrooms	8—12
General offices, restaurants (large), public halls	6—10
Domestic living rooms, private offices	4—6
Workshops (general)	3—6

Example.—Office 20′ x 30′ x 10′ = 6,000 cubic feet.
The Vent-Axia " Nine " handles 20,000 cubic feet per hour which gives over 3 air changes per hour, but the recommended rate is 4 to 6—A.C.H. Therefore two Vent-Axia " Nines " would be required for this office.

For further information and advice on installations of units See Distributors' Advertisement on Page 55.

STANLEY GALE VALVE.

Originated by M. S. Stanley, A.M.I.E., Australia.

This simple and effective method of ventilation for factories, garages, industrial buildings, etc., is used in conjunction with 3″ corrugated asbestos cement roofs.

It consists of a 2″ x 1″ batten nailed on top of the lower run of corrugated sheets the full length of building.

The next section of roofing sheets is fixed on top of this batten with the centre purlin in this section being ½″ more in width to prevent the springing of the sheets and possible cracking.

A minimum end lap of 9″ at junction of both sections is advisable to prevent stormwater being blown in. The actual corrugations in the sheets are the means of ventilation.

The wind causes a high pressure area of point of ingress and a low pressure area at point of egress.

This induces a continuous flow of air across the building, taking with it all factory fumes and gases.

This method is more economical than installing Ventilating Cowls or other ridge ventilating systems.

AIR PRESSURE.

One Atmosphere equals 14·7 lb. per square inch.
29·922 inches of Mercury at 32 deg. F.
33·947 feet of Water at 62 deg. F.

PUMPS AND HYDRAULICS

MEMORANDA.

To convert head in feet into pounds pressure per sq. inch, multiply by ·434.

To convert pressure per sq. inch into head in feet, multiply by 2.31.

To find the horse-power in water, multiply the quantity in cub. feet per minute by the head of water in feet, and the result by ·0016098. Result is based on an efficiency of 85 per cent. in the water wheel.

Doubling the diameter of a pipe increases its capacity four times.

Theoretically, water can be raised by suction 33 ft., but practically only 26 ft. to 29 ft.

Height of tank being known, to find diameter of tank, needed for any capacity: Divide quantity desired by ·0034, divide remainder by height in inches, and obtain sq. root. The value thus obtained is the diameter in inches, divided by 12 to obtain diameter in feet.

To find capacity of tank in gallons: Square diameter in inches, multiply by height in inches, multiply by ·0034, the product is the capacity in gallons.

ESTIMATING THE H.P. OF STREAMS.

When calculating a number of horse-power of a stream, estimate the number of cub-ft. flowing in a stream per minute, multiply it by the distance the water has to fall, and then multiply this by 0·0014, and you will get the actual number of horse-power obtained by a plant with 75 per cent. efficiency.

The figure 0·0014 is obtained as follows :—The weight of a cub. ft. of water (62·321), multiplied by efficiency (0·75), the total divided by 33·00 = 0·0014175."

1 **cubic foot** per second equals 374 Imp. gallons per minute.

1 **cubic foot** of **fresh water** weighs 62·5 lbs., and contains 6·232 gals.

1 **cubic foot** of **sea water** weighs 64·25 lbs.

1 **cylindrical foot** weighs 49·08 lbs., and contains 4·894 gals.

1 **gallon** weighs about 10 lbs. 8 **gallons** measure 1 bushel.

SIZES OF PIPES FOR WATER.

Table of approximate suitable diameters of pipes for conveying different quantities of water. For short mains up to 200 yards long, the diameter of pipe is not of much importance, but when they exceed 200 yards in length the diameters given in this table are desirable :—

Gals. per min.	Dia. of pipe	Weight of 100 ft. c. q. lb.	Gals. per min.	Dia. of pipe.
½	½	0 3 0	60	4
¾	¾	1 0 5	100	5
1½	1	1 1 22	160	6
3	1¼	2 1 10	220	7
5	1½	2 3 2	300	8
10	2	4 0 6	450	9
15	2½	6 0 8	500	10
20	3		800	12

WATER WEIGHTS AND MEASURES.

One Imp. gal. = 277·274 c. in.
,, ,, = ·16 c. ft.
,, ,, = 10·00 lbs.
,, ,, = 4·537 litres.
One U.S. gal. = 231 c. in.
,, ,, = ·133 c. ft.
,, ,, = 8·33 lbs.
,, ,, = ·83 Imp. gall.
,, ,, = 3·8 litres.
One cub. in. = ·00367 lb.
,, ,, = ·003607 Imp. gall.
One cub. ft. = 6·23 Imp. gall.
,, ,, = 28·375 litres.
,, ,, = ·0283 cub. metre
,, ,, = 62.35 lbs.
One lb. = 27·72 cub. in.
,, = ·10 Imp. gall.
,, = ·4537 kilo.
One cwt. = 11·2 Imp. gall.
,, = 1·8 c. ft.

One ton = 35·9 c. ft.
,, = 224 Imp. gall.
,, = 1000 litres (approx.).
,, = 1 c. metre (approx.).
One litre = ·22 Imp. gall.
,, = 61 c. in.
,, = ·0353 c. ft.
One cub. metre = 220 Imp. gall.
,, ,, = 1·308 c. yds.
,, ,, = 61028 c. in.
,, ,, = 35·31 c. ft.
,, ,, = 1000 kilos.
,, ,, = 1 ton (approx.).
,, ,, = 1000 litres.
One kilo of water = 2·204 lbs.
One vedro of water = 2·7 Imp. gall.
One eimer of water = 2·7 Imp. gall.
One pood of water = 3·6 Imp. gall.
One Russian fathom = 7 ft.
One atmosphere = 1·045 kilos. per sq. in.

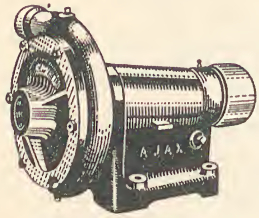
A column of water 1 foot high = ·434 lb. pressure per square inch.
A column of water 1 metre high = 1·43 lbs. pressure per square inch.
A pressure of 1 lb. per square inch = 2·31 feet of water in height.
One Imperial gallon crude petroleum = 8·2 lbs. (approximately).
One ton petroleum = 275 Imperial gallons (approximately).

THE PRESSURE OF WATER AT DIFFERENT HEADS.

(Per Square Inch.)

Head of water. ft.	Pressure. lbs.	Head of water. ft.	Pressure. lbs.
1 = ...	·433	100 = ...	43·3
2 = ...	·86	110 = ...	47·6
3 = ...	1·3	120 = ...	52·0
4 = ...	1·73	130 = ...	56·3
5 = ...	2·16	140 = ...	60·6
6 = ...	2·6	150 = ...	65·0
7 = ...	3·03	160 = ...	69·3
8 = ...	3·46	170 = ...	73·6
9 = ...	3·9	180 = ...	78·0
10 = ...	4·33	190 = ...	82·3
20 = ...	8·66	200 = ...	86·6
30 = ...	13·00	210 = ...	91·0
40 = ...	17·33	220 = ...	95·3
50 = ...	21·66	230 = ...	99·6
60 = ...	26·00	240 = ...	104·0
70 = ...	30·33	250 = ...	108·3
80 = ...	34·66	260 = ...	112·6
90 = ...	39·00	270 = ...	117·0

AJAX LOW DOWN DOUBLE ACTING LIFT AND FORCE PUMP.



This is one of the best types of Hand Pump. The suction lift must not exceed 25 feet at sea level. It is suitable for general pumping, excavations, irrigation, filling tanks, spearpoints and fire fighting.

Manufactured in two sizes, 3″ x 4½″ stroke and 5″ x 5″ stroke.

The 3″ x 4½″ for 1¼″ or larger piping giving 500 gallons per hour for maximum head of 115 ft.—Approx. price, £7 2s. 0d.

The 5″ x 5″ for 2″ or larger piping giving 1,400 G.P.H. at maximum head of 42 feet.—Approx. price, £7 13s. 6d.

AJAX DIAPHRAGM BILGE PUMPS—Hand or Power Drive.

Suitable for thick liquids, mud, slush, etc.

Pipe sizes :—2½″ or 3″ for hand and power drive.

SEMI ROTARY HAND PUMP.

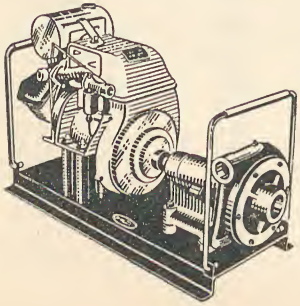
No. ...	...	0	1	2	3	4	5	6	7
Price	...	42/9	46/2	54/9	66/9	81/5	91/6	113/9	153/9

AJAX CENTRIFUGAL PUMPS (Ball Bearing).

For direct coupling to electric motors (any voltage), oil engines, for flat or Vee belt drive. Suitable for Maximum heads to 230 feet, or 100 lbs. pressure.

Discharge	¾″	1″	1¼″	1½″	2″	3″	4″
Gals. Min.	5/25	10/30	35/45	50/80	90/130	140/350	
Max. Head	60′	60′	50′	50′	50′	50′	50′
Price £	5/9/6	6/2/–	8/–/–	8/11/6	14/4/–	25/3/6	27/10/–
Gals. Min.	—	10/30	35/40	45/80	90/140	150/275	300/450
Max. Head	—	110′	100′	110′	110′	110′	100′
Price £	—	8/–/–	8/–/–	13/17/–	15/2/–	26/2/–	27/13/–
Gals. Min.	—	10/20	—	20/80	90/150	—	—
Max. Head	—	230′	—	250′	220′	—	—
Price £	—	16/4/–	—	23/4/–	24/16/–	—	—

AJAX ENGINE DRIVEN PORTABLE CENTRIFUGAL PUMP.



Direct coupled to four cycle, fan cooled, governor controlled, light weight unit arranged on steel base with handles.

CM1½ type :—Pump with 2/2½ H.P. Pilot Engine for 2″ Suction Hose.—Price, £78 10s. 0d.

CM2 Type :—Pump with 3 H.P. Wing Engine for 2½″ Suction Hose.—Price, £94 0s. 0d.

AJAX ELECTRIC MOTOR DRIVEN CENTRIFUGAL PUMPS.

Direct Coupled and fixed on combined Base.

¾" Ajax Pump direct coupled 1/2 h.p., 240 volt or 415 volt A.C. Motor for Heads up to 48 ft.—Price, £

	£	s.	d.
CM1 Ajax Pump with 1 h.p. 415 volt Motor for 50 ft. Head ...	38	0	0
CB1½ Ajax Pump with 2 h.p. 415 volt Motor for 50 ft. Head	52	6	6
CB2 Ajax Pump with 3 h.p. 415 volt Motor for 50 ft. Head	60	8	6
CMH1 Ajax Pump with 2 h.p. 415 volt Motor for 100 ft. Head	43	0	0
CMH1¼ Ajax Pump with 3 h.p. 415 volt Motor for 100 ft. Head	48	0	0
CMH1½ Ajax Pump with 5 h.p. 415 volt Motor for 100 ft. Head	61	7	0
CMHH1 Ajax Pump with 7½ h.p. 415 volt Motor for 230 ft. Head	68	15	6
CMHH1½ Ajax Pump with 12½ h.p. 415 volt Motor for 250 ft. Head	79	13	0
CMHH2 Ajax Pump with 15 h.p. 415 volt Motor for 220 ft. Head	99	11	0

CV1 Ajax Vertical Centrifugal Pump for sumps, cellars, etc., 4 ft. overall.—Price, £67 10s. 0d.

A1½ Self Oiling Double Acting Piston Pump with 1/3 h.p. 240 volt A.C. Motor and vee drive for Septic tanks, cellars, spearpoints, etc.—Price, £35 0s. 0d.

Automatic Water Supply System with A1½ Pump, 1/2 h.p. 240 volt Capacitor A.C. Motor, Pressure Tank, Pressure Gauge, Pressure Switch, Relief Valve, Check Valve and sundry fittings.—Approx. Price, £72 10s. 0d.

Running water with a turn of the tap.

AJAX SELF OILING DOUBLE ACTING PISTON PUMP.

With or without Electric Motor for heads up to 250 ft.

Cylinders.	Piping.	Gals. per hr.	Price Pump only
2½ x 3	1¼	420	£39 5 0
3 x 4	1½	825	47 6 0
4 x 5	2	1760	68 17 0
5 x 5	2½	2460	74 3 0
6 x 6	3	3720	114 2 0

For further information See Advertisement, Page 56.

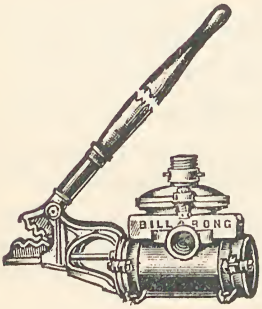
DANKS WINDMILLS—Mill Heads Only.

Feet	Billabong.	Cooee.	Sirdar.
	£ s. d.	£ s. d.	£ s. d.
6	36 12 0	29 2 0	35 0 0
8	40 12 0	33 0 0	40 0 0
12	92 0 0	—	82 6 10
14	—	—	96 18 0

DANKS WINDMILL AND DEEP WELL PUMPS.

Pipe Diam.	5301/P10	5305/P12	5311/P16
	£ s. d.	£ s. d.	£ s. d.
2″	9 13 8	6 7 6	4 11 8
2½″	10 16 4	7 3 8	5 8 9
3″	12 0 7	8 4 1	6 7 6
3½″	—	9 8 3	7 14 6

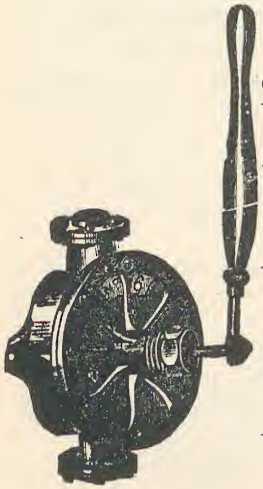
"BILLABONG" LOW DOWN DOUBLE-ACTING FORCE PUMPS.
A Hand Pump with Easy Action.



3″ x 4″ Capacity 480 gallons per hour. For 1¼″ pipe.—Approx. Price, each, 132/6.

5″ x 5″ Capacity 1,680 gallons per hour. For 2″ pipe.—Approx. Price, each 155/–.

"BILLABONG" SEMI-ROTARY PUMPS.



A hand-pump for all general purposes. Constructed with cast iron body, brass valves and valve seats.

Suitable for heads up to 50 ft.

No. of Pump	Pipe Sizes Inches	Gals. Per Hour	Weight Approx. in lbs.	Approx. Price
0	½	175	12	45/–
1	¾	396	13	50/–
2	1	528	18	57/6
3	1¼	662	27	72/6
4	1¼	888	45	85/–
5	1½	1192	40	100/–

"BILLABONG" CENTRIFUGAL PUMPS.

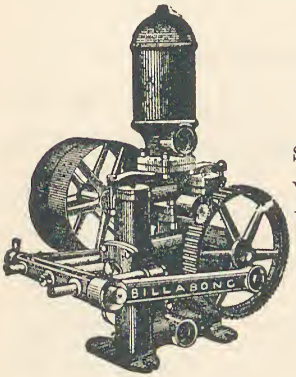
LOW DUTY PUMPS

Pipe Size	Gals per min.	Approx. Price £ s. d.
¾″	15	7 5 0
1″	20	11 10 0
1¼″	30	12 4 0
1½″	50	15 0 0
2″	80	19 10 0
2½″	120	23 10 0
3″	250	28 0 0
4″	360	33 0 0
5″	550	48 0 0
6″	800	61 0 0
8″	1050	70 0 0

HIGH DUTY PUMPS

Pipe Size	Gals. per min.	Approx. Price £ s. d.
1″	25	13 8 3
1½″	60	25 18 0
2″	90	30 0 0
2½″	150	35 10 0
3″	225	40 12 0

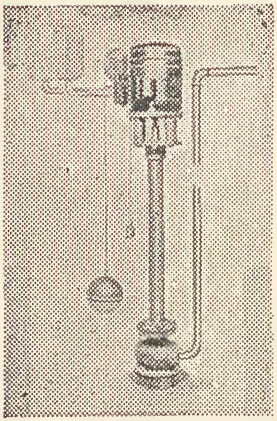
BILLABONG DOUBLE ACTING PISTON PUMPS.



Suitable for elevations up to 250 ft. head with fast and loose pulleys for electric, petrol or other belt drives.

Size Diam. and Stroke	Inside Dia. of Suction and Delivery	Gallons Per Hour, not allowing for Slippage	Weight in lbs. approx.	Price £ s. d.
Inches	Inches	Imp.		
2½ x 4	1¼	339	150	39 0 0
3 x 5	1½	611	280	42 0 0
4 x 5	2	1086	325	62 0 0
5 x 5	2½	1697	500	78 0 0

DANKS SIRDAR SUBMERGED SUMP PUMPS.

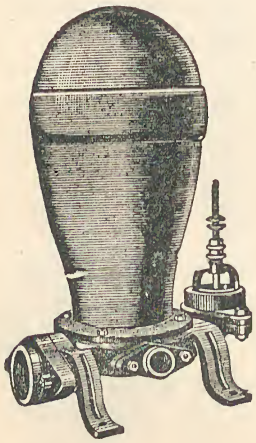


Capacity : 1,200 gals. per hour up to 15 ft. head.
Standard Length of column, 30″.
Supplied complete with electric motor and float switch for automatic operation.
Note.—The length of column can be extended for deep septic tanks or cellar sumps.

Approximate Price.
Complete with motor Contactor and float switch —£71 0s. 0d.

DANKS BILLABONG HYDRAULIC RAMS.

Requires no power other than water from a stream. The most revolutionary and economical pumping unit available.



The hydraulic ram depends on the velocity of water passing through a drive pipe for its power. Consequently it is essential that a fall be obtainable from the source of supply. The drive water flows through a waterway in the base of the ram and passes through the impetus valve A. This flow continues until sufficient force is created to lift and close the impetus valve. The moving column of water is then directed into the air chamber or dome B by means of a spring loaded valve in the base, and compresses the air in the dome until the pressure in the chamber equals that in the drive pipe. The air chamber then closes and the compressed air trapped in the dome forces the water along the delivery pipe. The force built up being expended in this manner allows the impetus valve to open and the drive water runs to waste once more and so the process is repeated.

No. of Ram	Pipes Inside diameter in inches Drive	Discharge	Approx. No. of gallons per minute required to operate Ram	Weight approx. in pounds	Approx. Prices
3	1 ins.	½ in.	1¼ to 4	29	£9 0 0
4	1¼ ,,	½ ,,	3 ,, 7	35	£11 10 0
5	2 ,,	¾ ,,	6 ,, 14	55	£14 0 0
6	2½ ,,	1 ,,	12 ,, 25	125	£23 10 0
7	3 ,,	1½ ,,	20 ,, 40	200	£32 0 0
10	4 ,,	2 ,,	25 ,, 100	700	£87 0 0

TABLE SHOWING EFFICIENCY OF THE HYDRAULIC RAM.

Minimum fall of water in ft., under which ram will effectively elevate water to height given below ...	2	2	2	3	4	5	6	7	8	10	12	14	16	18	20
Height, in ft., the water may be elevated ...	4	6	8	15	24	35	48	63	80	100	120	140	160	180	200
Length of drive pipe, in ft.	12	12	12	15	20	30	40	50	60	75	95	110	125	140	160

DANKS WATERBOY DOUBLE ACTING SELF OILING PISTON PUMP.

Suitable for heads up to 250 ft. or the equivalent pressures.

Number	Diameter	Stroke	Gallons Per Hour	Suction and Discharge	Approx. Price
	in.	in.		in.	£ s. d.
912	2½	3	450	1¼	43 12 6
913	3	4	850	1½	54 9 9
914	4	5	1750	2	80 2 0
915	5	5	2550	2½	96 0 0
916	6½	6	3800	3	134 16 3

A High Duty Pump is also manufactured in this line and particulars may be obtained on application. Total heads of 570 ft. may be attained with the High Duty Waterboy.

SIRDAR DOUBLE ACTING PISTON PUMPS.

Self priming, self oiling, totally enclosed horizontal, noiseless, double acting power piston pump.

Approx. Price.—Pump only, £24 10s. 0d.

Pump with ½ h.p. Motor and Vee Belt Drive, £37 7s. 0d.

See Advertisement, Page 72.

PILE DRIVING

TIMBER PILES—WHARVES AND JETTIES.

Timbers best suited for piles are turpentine, grey box, tallowwood and iron bark. Turpentine is best for salt water as it is resistant to attacks by Teredo.

Muntz metal sheeting is used as a protective covering against attacks by Teredo.

The usual minimum standard for timber piles is 18″ on top and 12″ at toe of pile.

Timber piles are usually driven by a 30 cwt. or 2 ton drop hammer (or " monkey ") operated by a friction winch, with a usual drop of 8 feet.

Often a two-drum winch is used, the second drum operating the pile-handling line. The hammer runs in guides or leaders forming part of a pile frame—usually of timber construction but now often of light steel.

The plant can either be rigged on the land or on floating plant. Generally the land based plant is the cheaper to operate, especially where the harbour is subject to range (wave action).

Where the ground is at all hard the toes of the piles are pointed and shod with steel shoes. The heads are trimmed, cut square and fitted with a steel ring to prevent splitting of the pile head during driving.

The weight of the hammer should be at least half that of the pile.

The " set " or penetration of the pile per blow should be carefully measured over the last few blows, and driving continued until the specified " set " has been obtained, corresponding with the load to be carried. The " set " may be determined by the Engineering-News formula or the newer Hiley formula, the latter being the more exact, as it allows for the weight of the pile and temporary compression of the cap, pile and the ground during driving, but these details would be supplied by the Engineer-in-Charge of the work.

In sand or other granular material pile driving may be assisted by jetting beside the pile with a high pressure water jet ; this should be discontinued before the full depth is reached, and final driving done under normal conditions. Jetting pipes are usually 2″ diameter, and pumps of high pressure type with a capacity of 150 gal. per min.

Sometimes a tripper is used, which allows the hammer to fall freely in the leaders, thus giving the full blow ; the tripper must then be lowered and the hammer re-engaged. Where a tripper is not used a somewhat greater drop, say 20 per cent., should be given the hammer to compensate for overhauling the rope and drum.

COSTS—TIMBER PILES.

Timber piles cost from 12/– to 15/– per lineal foot or approximately 7/6 per cubic foot. Driving costs vary from 12/– to 14/– per lineal foot of length driven, based on the conditions of driving, shallow or deep water etc. The above prices are for vertical driving. Raking piles cost from 25 per cent. to 50 per cent. more.

Cartage and transport of pile driver not included in above prices.

REINFORCED CONCRETE PILES.

Concrete Piles are coming into increasing use on wharf and other construction. As heavy a hammer as possible should be used, with a small drop, to avoid shattering the pile head. As an example, if driving a pile weighing 5 or 6 tons, it would be good practice to use a 4 ton drop hammer, falling 3 feet.

A special steel driving head is used with a hardwood dolly on top and about 2″ of soft wood or other packing on top of the pile.

Concrete piles have steel shoes cast into their toes, and the piles should never be driven to refusal in rock as the concrete will be cracked and salt water will reach the steel reinforcement and cause spalling of the concrete and failure of the pile.

Particular care should be taken in casting concrete piles, and modern methods of concrete control should be adopted, using a rich, comparatively dry mix. Concrete should be vibrated, preferably by tube type vibrators, but not over vibrated, and the water-cement ratio should be closely controlled and should not exceed 0.50 by weight. This will ensure a strong impermeable concrete.

Care should also be taken in handling concrete piles to avoid cracking the surface concrete and they should be lifted at two places between the quarter and fifth points.

Reinforced-concrete piles have many advantages over piles of steel or timber. They are not affected by any of the factors which cause other piles to deteriorate. Should they be required to be driven to a greater depth than anticipated they can be lengthened after driving has commenced without withdrawal. They are of precast Portland Cement concrete, reinforced with mild steel rods and manufactured to a rigid specification. The usual size used in bridge construction is 13 inches square section, and the lengths usually 30 ft. to 35 ft. for ease in handling. Loads up to 40 tons are usual on such piles but piles may be manufactured to take a load of 60 tons per pile. The safe load on a pile depends on the skin friction between the pile and the ground into which it is driven.

Piles are driven to refusal or until the last four blows from a hammer falling from a fixed height give a specified penetration. Usually a 4 ton hammer falling 3 ft. is used and the penetration must not exceed $\frac{1}{4}$ inch per blow for the last four blows where the load on pile exceeds 25 tons or $\frac{1}{2}$ inch per blow where the pile load is 25 tons or less.

For other weights of drop hammers the penetration is tested with a fall such that the product of the height and weight equals 12 foot tons. The minimum weight of hammer to be used however is 2 tons and in this case the drop will be 6 feet.

Usually test piles are driven to refusal.

The safe load on concrete piles can be calculated from the following formula :—

$$\text{Safe Load on Pile (tons)} = \frac{W^2\ h}{d\ (W + P)} \div \text{Factor of Safety.}$$

Where W—Weight of hammer (tons).
h— height of fall (inches).
P— weight of pile (tons).
d— average penetration of last four blows in inches.

Concrete piles may be assumed to weigh 160 lbs. per cu. ft. The factor of safety varies from 3 to 8 according to the nature of the load the pile is intended to carry. A brickwork load or loads affected by movement would require a factor of safety of 8 while a resilient load such as wharfage, etc., would be satisfied by a factor of safety of 3.

APPROXIMATE COSTS—CONCRETE PILES.

The cost of manufacture on site including shoe, £17 per cu. yd. Cost of driving varies from 20/– to 24/– per lineal foot of length driven. The prices vary according to the difficulty of driving, type of material encountered, deep or shallow water etc. Shallow water driving and short piles cost more than deep water pile driving.

Steel Sheet Piling.—For coffer-dam work or backing for wharves steel sheet piling is commonly used, one pile interlocking into a groove in the next, thus forming a nearly water-tight face or wall.

Pile driving is most conceniently done with a double-acting steam hammer of the McKiernan-Terry type. There are also a number of makes of single-acting steam hammers on the market, and the makers will supply full technical details.

For driving in tight ground it is essential to have a good supply of steam. Supply pipes should be as short as possible, of ample size, and preferably lagged.

The smaller sizes of double-acting hammers may be reversed and used for extracting piles by using special links and jaws. Also special extracting hammers are available on the market.

Pile frames are not needed for extracting piles and extractor or reversed hammer may be hung from a crane.

Steel piles have a tendency to " creep ", or gradually get out of plumb, and it is often necessary to drive wedge piles at intervals to correct this, or to resort to " panel " driving, when a panel of piles is only partially driven in the first instance, and then progressively driven to the full depth.

Underwater Driving.—When driving piles under water or below the level of the frame a " dolly " or follower may be used, provided the pile cannot get out of line ; where the pile must be still supported, special rigs are made with extension leads reaching below the pile frame. Some steam hammers, notably the 11B3 McKiernan Terry hammer, are fitted with a special air attachment and can continue to operate under water.

Special Rigs.—There are numerous ways of driving piles, particularly steel sheet piles, without the use of pile frames.

Hanging leads can be hung from a crane, a second rope lowering the hammer, but the pile must be well held by an adjacent pile or be in guides.

Also steam hammers can be fitted with guides, or shoes, extending about 4 feet below the hammer, which then fits snugly on the pile ; the hammer or pile can then be guyed to steady the pile during driving and the hammer cannot fall off the pile and gives a true blow.

The steam hose to the hammer should be flexible steel or copper, spirally wrapped.

ROADS AND PAVEMENTS

B. R. Newton-Tabrett, B.E., A.M.I.E.Aust., Chartered Engineer (Aust.) Sydney.

EARTH ROADS.

Earth roads consist of natural surfaces of clay, clay-loam, loamy silt, gravelly or sandy material, cleared of timber or other obstructions and graded up to give a smooth surface capable of carrying traffic under normal weather conditions. Where the natural material is incapable of carrying traffic under all weather conditions due to excess clay or sand, additional sand or clay must be added in the correct proportions to give a stable surface. This type of road is known as a sand-clay road.

CONSTRUCTION.

DRAINAGE :—Good drainage is essential in all types of road construction. Without adequate drainage road pavements of all types will eventually disintegrate under traffic. Correct drainage calls for careful investigation to determine :—

(a) Catchment area and run-off from adjacent land which will affect the road to be constructed.
(b) Levels of ground-water.
(c) Position of any natural water courses which flow to or across the road.

In **Urban** areas careful investigation is needed to determine the methods to be adopted to cater for water flowing on to the road and for water flowing off the road after construction. Kerb and gutter, gully pits, stormwater drains must be designed and necessary drainage easements surveyed through adjoining properties.

In **Rural** areas, although careful investigation is also necessary, drainage works are often of a simpler type. Generally, adequate drainage can be obtained by the construction of side or catch drains on the high side of cuttings and embankments ; the construction of water table drains on the edges of the pavement and necessary culverts or dish crossings to take the surface water flow across the road.

Ground-water levels in all cases, both in rural and urban areas, must be determined and, where necessary, lowered to protect the pavement by the use of sub-soil drainage works and, where necessary, agricultural or unglazed earthenware pipes or french (rubble) drains must be constructed. Sub-soil drainage becomes essential where the earth road is constructed as a base for a future permanent pavement, or where it is to be sheeted with gravel and later sealed with a bituminous material. Once a road pavement is sealed, capillarity (water absorption by capillary attraction) plays an important part.

Many unsealed earth and gravel roads cause no difficulties and carry moderate traffic until they are sealed, when failures may occur due to capillarity unless the sub-soil drainage has been effectively constructed.

GRADING :—Where cutting and filling in earth or gravel less than 1 foot in depth is necessary for longitudinal grading, power graders can be used economically to form the surface of the road, cutting the water tables, boxing (in case of gravel or macadam pavements) and forming the road to finished levels.

Earthworks :—Any cut and fill greater than 1 foot in depth is best handled by bull-dozer, angle-dozer or scoops of the power operated type. Cutting in rock can be handled by heavy power operated rippers or blasted out by explosives.

Consolidation is usually effected during grading operations but if the road is being prepared as a base for a gravel or permanent pavement thorough consolidation is necessary. This is done by the use of suitable power rollers, rubber-tyred rollers and in heavy fills by sheep-foot or similar type rollers.

COSTS.

The costs given are subject to the following conditions :—

(a) They are average costs only and may vary considerably in different districts throughout N.S.W.

(b) They are based on present cost of materials of local origin and on labour at a Basic Wage Rate of £8 6s. 0d.

(c) The costs given should be increased by 10 per cent. to cover Workers' Compensation payment, Pay Roll Tax, Holidays and Miscellaneous Charges.

(d) Where camps are established allow an addition of £20 per man for camp establishment ; allow a camp maintenance charge of 15/– per man per week ; add a camping allowance of 5/– per man per day.

(e) Costs make no allowance for the transfer of equipment and plant to and from the job.

(f) Costs do not include any other overhead, supervision charges or profit margin.

Add percentage increase in Basic Wage to prices.

Construction Costs.

Catch or side drain excavation in earth or loam, etc.	47/6 per 100 lin. ft.
Scarifying and grading road including water table drains in earth or loam (average depth of cut and fill of 6 inch)	7d. per sq. yd.
Cutting in earth or loam (solid measurement)	3/3 per cu. yd.
in rock-sandstone or similar rock, including drilling and blasting (solid measurement)	13/6 per cu. yd.
in hard granite including drilling and blasting (solid measurement) ...	23/– per cu. yd.
Excavation, supplying, laying of 4 in. unglazed pipes and back-fill.	
in earth or loam	£12 per 100 lin. ft.
in rock	£35 per 100 lin. ft.
Rolling and consolidating—maximum depth 12 inches	2d. per sq. yd.

Maintenance Costs.

Regrading or surface dragging	2d. per sq. yd.

GRAVEL ROADS.

Gravel road pavements may be natural gravel surfaces, graded and shaped as for earth road construction or more usually, pavements of approved gravel placed on prepared base or subgrade. In every case it is necessary for the subgrade or formation to be prepared as for earth road construction but boxing is cut on the edges of the pavement to the required finished depth of gravel to hold the gravel in place.

Gravels may be classified as under :—

(a) River or creek gravel—smooth water-worn stones, crushed or crushed and screened to specified sizes and containing sufficient cementitious material to bind, with or without watering, into a hard mass.
(b) Sedementary rocks—shales, slates, etc.
(c) Decomposed rocks—decomposed granite, decomposed basalt, etc.
(d) Various forms of impregnated rocks—ironstone, etc.

All gravels are specified to be graded into specified sizes in various proportions and containing specified percentage of clay or other cementitious material.

Construction.

(a) Adequate drainage works must be constructed as given for earth road construction.
(b) Subgrade or formation must be formed and consolidated as for earth roads except that boxing is cut during the grading operations to hold the gravel pavement.
(c) Gravel as specified must be dug from pits, crushed and screened or screened if necessary, or shot out with explosives where in tight formation. It must be loaded, hauled and spread on road formation, already shaped and consolidated, by means of tipping trucks properly controlled so that gravel is spread to an even specified thickness. It must be graded and shaped to correct longitudinal grades and cross-fall, Finally it is consolidated by rolling, water being applied if necessary, during the process. Consolidation can be done by grading in the first instance, then rolling with a suitable power roller usually weighing 7 to 8 tons.

Construction Costs.

Cost of construction of catch or side drains, subsoil drains, cut and fill and preparation of subgrade or formation as for earth roads.	
Supply, load and haul gravel up to 2 miles from pit (loose measurement)	7/6 per cu. yd.
Supply load and haul gravel up to 2 miles from pit—6 inch consolidated thickness allowing 50 per cent. consolidation ...	1/9 per sq. yd.
Spread and consolidate gravel—6 inch. thick watering if necessary	6d. per sq. yd.

Maintenance Costs.

Regrade or shape gravel pavement	4d. per sq. yd.

SAND-CLAY ROADS.

Where the natural soil is clay, the supporting or resisting power of the surface during wet weather can be increased by the addition of sand. Where the natural soil is deep sand, the surface can be made firm and capable of carrying traffic by the addition of clay.

The sand-clay road provides a surface layer of mixed sand and clay in which the sand forms the body and the clay just fills the voids in the sand and acts as a binder.

Construction.

(a) Adequate drainage works must be constructed as set out for earth road construction.
(b) Subgrade or formation is formed true to longitudinal grading and crossfall.
(c) Sand or clay is then spread evenly over the formation in the correct quantities as determined by test and shown in the specifications.
(d) The required thickness of the sand-clay is then thoroughly mixed by harrows, rotary hoe or power grader, and then shaped by grader to give the correct grades.
(e) Water is added and mixing continued if rain does not occur during the mixing, or the sand-clay mix may be left dry and regraded and shaped after rain has fallen and under traffic.

COSTS.

i. Construction Costs.

Cost of construction of catch or side drains, subsoil drains, cut and fill and preparation of subgrade or formation as for earth road construction.

Supply, load and spreading sand or clay (including haul up to 2 miles) (measured loose) ... ... 6/– per cu. yd.
Mixing of materials by machine as above ... 7d. per sq. yd.
Grading and shaping ... ... 7d. per sq. yd.

ii. Maintenance Costs.

Remixing and grading under traffic and after rain ... ... 7d. per sq. yd. each time.

STABILISED ROADS.

As mentioned previously natural clay, loam and gravels are subject to capillarity and when used as a sub-base for pavements of a permanent nature, must be protected against this action. One method which is now coming into general use is to stabilise the soil, etc., against this action by the admixture of bitumen in the form of bituminous emulsions or by portland cement. In each case the object is to increase the water-repelling properties of the soils or gravel and to increase the bearing capacity. It is possible by the correct stabilisation of soils using bituminous emulsions to reduce the water absorption to less than 3 per cent.

Before the specification for the work is drawn up it is necessary to make a very thorough soil survey and analysis to determine the characteristics of the soil; the gain size; percentage of colloids and liquid and plastic limits. From this information, tests are carried out in the laboratory to determine the correct quantities of bituminous emulsions or portland cement required to stabilise the soils or gravels.

Generally speaking, stabilisation by bituminous emulsions is recommended for soils high in colloids usually in the form of clays while soil-cement stabilisation lends itself readily to the stabilisation of sandy loams, gravelly clays and soils low in colloids.

Construction.—Bituminous Emulsion Stabilisation.

This can be carried out by three methods.—(a) Mixed-in-place method; (b) Premixed method; (c) Plant mix (Travelling or mobile).

Mixed-in-Place Method.

(a) This method is the more usual method employed in N.S.W. at this date. The subgrade is scarified and shaped by means of power graders to give the correct longitudinal grades and cross-fall between water tables.

(b) Necessary sub-soil drainage is constructed as for earth roads, and drainage works for surface water control are constructed.

(c) The soil is then scarified and pulverised to the required depth (usually to give 4 in. to 6 in. completed consolidated pavement), between pavement edges to form boxing on either side. Pulverising is best carried out using pulvimixers or rotary tillers of the Siemens or similar type.

(d) If sand or clay has to be added in accordance with the specification, same is spread evenly over the surface to the correct depth by fan-tailing from tipping trucks.

(e) The soil and added material is then thoroughly mixed by means of the pulvimixers and if necessary the pavement brought into correct shape as before.

(f) The specified quantities of water and bituminous emulsion is then sprayed over the mixture by means of power sprayers and the whole remixed. Water is sprayed to bring the mix to a condition of optimum water content and often slightly to exceed the optimum where heavy clays are being treated.

(g) Consolidation is effected at or near the optimum water content, in the first instance, by the use of rubber-tyred rollers and traffic where feasible, and continued with intermittent grading to maintain the shape, until the stabilised soil sets up.

Premixed Method.

(a) The correct proportions of soil, clay or sand are then mixed in specially designed rotary mixers. The specified quantities of bituminous emulsion and water is then added and the mixing continued until the soil is thoroughly mixed.

(b) The mixture is then loaded into tipping trucks and hauled to the prepared subgrade.

(c) At the site, the soil is then spread evenly over the subgrade to the specified thickness, allowance being made for contraction during setting. The spreading is usually done by means of spreading drags attached to the trucks.
(d) Power graders are then used to finally spread the material to the correct grade and crossfall after a partial set-up of the stabilised soil.
(e) Consolidation is then effected as in the previous method.

Plant Mix (Travelling or Mobile).

(a) The subgrade is prepared as in Method 1.
(b) Sand or clay is added as specified and the whole of the material to be stabilised is then placed in to windrows on the subgrade and shaped by windrow shapers to give the correct quantities on the subgrade.
(c) A mobile or travelling plant, specially designed for the work, is then drawn over each windrow in turn and the material is passed through the plant, correct calibrated quantities of water and emulsion being added during the process.
(d) The completely mixed material is spread evenly by the mobile plant on the prepared subgrade as it travels over the windrows. The whole process is continuous and carefully and scientifically controlled.
(e) Consolidation and shaping is carried out as in the second method mentioned above.

In the three methods, when the stabilised soil is sufficiently hard to carry traffic, controlled traffic is allowed to use the road. Intermittent grading is continued during the period and until such time as the soil is completely set up to give a hard water-proof surface. The surface can be left unsealed until wear from traffic is noticed.

The surface is then sealed against traffic wear by either flush sealing or premixed bitumen surfacing.

Construction Costs.

Subgrade preparation, subsoil drainage, surface drainage works, cut and fill as for earth roads.

Mixed-in-Place Method.

Stabilised pavement only—for 4 in. consolidated depth (Unsealed) ... ... 7/6 per sq. yd.

Premixed Method.

Stabilised pavement only—for 4 in. consolidated depth (Unsealed) ... ... 9/– per sq. yd.

Mobile Plant Method.

Stabilised pavement only—costs not available in Australia but probably half the above cost.

Sealing.—Costs given later.

Soil-Cement Mix.

This process can be carried out by three methods in a similar way to Bituminous stabilisation and it will suffice to describe the mixed-in-place method.

Mixed-in-place Method.

(a) In this process the soil is first scarified to within ½ inch of the depth to which it is to be stabilised and the soil is then pulverised until at least 80 per cent. (excluding stones) passes the $\frac{3}{16}$th inch sieve. It is generally advisable to pulverise and water the soil one day in advance of the stabilisation work. Rotary tillers or similar machines are used for the work.

(b) Cement as specified is then spread by hand from bags dumped at regular intervals on the subgrade and then more evenly distributed by the use of spiked harrows or power grader.

(c) Cement and soil is then mixed using pulvimixers or rotary tillers. Experience has shown that it is desirable to mix at a moisture content slightly higher than optimum except where heavy rain is expected. If more water is required during the mixing oporation it should be added carefully and well mixed with the soil to its full depth.

(d) After mixing, the surface is graded and compacted. Compaction is done by vibration or by rolling. For gravelly and sandy soils a rubber tyred roller is most suitable. For clean loose sands such as dune sands, vibratory machines or pneumatic tampers are the most effective tools.

(e) **Curing.**—Soil-cement requires curing in the same way as concrete and should be kept moist for 7 days after laying. This is done by covering with water-proof paper, damp matting or damp soil.

After the soil-cement is completely set up it is sealed against traffic wear in a similar way to soils stabilised by the emulsion process.

COSTS.

Construction Costs.

Subgrade preparation, subsoil drainage, surface drainage works, cut and fill as for earthworks, etc., for earth roads.

Mixed-in-Place Method.

Stabilised pavement only—4 in. consolidated depth (unsealed) ... ... 7/6 per sq. yd.

Premixed Method.

Stabilised pavement only—4 in. consolidated depth. (unsealed) ... ... 9/- per sq. yd.

BITUMINOUS FLUSH SEAL.

Gravel roads, stabilised roads, or macadam roads may be flush sealed with bitumen or tar-bitumen mixtures to protect the surface against attrition due to traffic and to give an all-weather road.

Construction.

(a) The road surface must be in proper shape and conform to the longitudinal grades and crossfall. Faults in grades or crossfall should be rectified. In the case of gravel roads, this is done by scarifying, grading and adding additional gravel, which is consolidated by rolling and watering. Stabilised roads are rectified by light grading only. Old macadam roads are best treated by scarifying, grading and if necessary resheeting with gravel as for gravel roads.

This should be done well ahead of the sealing so that the new gravel is thoroughly consolidated. Just prior to sealing, light grading is generally advisable.

(b) The surface is then swept thoroughly with a rotary broom and any loose material removed to the shoulders. Shoulders should be built up where necessary to give correct shape.

(c) Priming tar or bitumen road oil is then sprayed by means of power operated sprayers at the rate specified (usually 0.2 gallons per sq. yd. of surface measured at 60 deg. F.) and at the temperature specified (usually 200 deg. to 250 deg. F.).

(d) When priming tar or road oil has set up completely and not before a period of 3 days has elapsed from the time of application of priming coat, a seal coat of tar-bitumen mixture or fluxed bitumen as specified is sprayed by means of a power sprayer at the rate specified, on the primed surface (usually sprayed at a temperature of 270 deg. to 325 deg. F. for bitumen and at a rate of 0.3 gallons of bitumen per sq. yd. of surface, measured at 60 deg. F.).

(e) Aggregate—Crushed metal or crushed river gravel as specified, is spread evenly over the sealcoat of bitumen or tar-bitumen, immediately after spraying, by means of tipping trucks fitted with approved fan-tails at the specified rate per sq. yd. of surface (usually $\frac{3}{8}$ in or $\frac{3}{4}$ in. and $\frac{5}{16}$ in. gauge aggregate is used at the combined rate of 1 cu. yd. to 60 sq. yds. of surface).

(f) Aggregate is then rolled usually with a three-wheeled roller weighing 7–8 tons. Excessive rolling is not desirable.

(g) Broom dragging, to spread any small heaps of aggregate evenly, may be used followed by further rolling to press the aggregate evenly into the bitumen or tar-bitumen seal.

Construction Costs.

1/7 to 1/10 per sq. yd. of surface, depending on locality and availability of materials.

Maintenance Costs.

Resealing with bitumen or tar-bitumen mixtures is usually required within three years of sealing, depending on traffic and local conditions. Resealing is usually at the rate of 0.25 gall. per sq. yd. of surface and the cost is 1/3 to 1/6 per sq. yd. depending on locality etc.

PREMIXED BITUMEN PAVEMENTS (Hot Mix—Open Type).

Premixed bitumen or Premixed Bituminous Macadam of the Hot Mix Open Type can be applied to any sealed surface, prepared macadam base, ballasted or stabilised base or concrete pavement in depths ranging from $\frac{3}{4}$ inch to 3 inch consolidated thickness. The premixed bitumen is specially prepared in hot mixing plants either of the stationary or portable types and must be scientifically controlled during the mixing to give satisfactory results. The premix consists essentially, of graded sizes of crushed metal, dried, heated and mixed with specified grades of bitumen, itself heated to specified temperatures. It is spread on the road while hot.

Construction.

The premixed bitumen is spread on the road surface to give the specified thickness when consolidated, from tipping trucks, by means of a drag spreader or similar machine. Where concrete roads are to be surfaced it is usual to spray a tack coat of bituminous emulsion at the rate of 1/10th gallon per sq. yd. of surface to increase the adhesion of the premix. This tack coat can also be applied to the other bases mentioned above if required.

Consolidation is effected by careful and thorough rolling with a three-wheeled or tandem roller weighing 8–10 tons. This coat is more effectively rolled by using tandem rollers of less weight.

The edges often require hand raking prior to rolling.

If necessary or specified, the surface of the premix may be sealed with bitumen.

COSTS.

Standard Hot Premix.

¾ inch	consolidated	thickness	...	...	3/3	per	sq.	yd.
1 inch	,,	,,	...	...	4/6	,,	,,	,,
1½ inch	,,	,,	...	...	6/6	,,	,,	,,
2 inch	,,	,,	...	...	9/–	,,	,,	,,
3 inch	,,	,,	...	...	12/–	,,	,,	,,

The above costs are based on a haul of 10 miles from the hot mix plant.

For mileages less than 10 miles, costs can be calculated from the following :—

Premix cost at mixing plant ...	...60/– per ton.
Covering capacity—1 ton covers 21 sq. yds. for 1 inch thickness consolidated.	
Cost of spreading and consolidating	...11/– to 14/– per ton.
Haulage rates—¼ mile haul ...	... 1/– per ton.
1 mile haul ...	... 1/6 per ton.
1 mile to 5 miles	... 9d. per ton mile.
5 miles to 10 miles	... 7d. per ton mile.
Asphaltic concrete (stone filled)	... 90/– per ton at mixing plant.

BITUMEN PENETRATION MACADAM.

The surface course shall consist of one layer (usually 2 in. to 3 in. consolidated depth on completion), composed of broken stone, screenings and bitumen, constructed in accordance with the specifications, on the prepared base course.

Construction.

(a) The base is prepared as for gravel roads, swept clean of dust and foreign substances, and broken stone of approved quality and gauge is spread evenly on the base from approved tipping trucks using fantails or other approved spreaders. If suitable spreaders are not available, the stone may be tipped on dumping boards and spread by hand to the required thickness.

(b) The broken stone is rolled dry with a power roller weighing not less than 6 tons until the fragments of stone are keyed together and the surface becomes even and conforms to the desired contour without being closed up to such an extent as to prevent the stone being grouted with hot bitumen.

(c) Bitumen of the grade specified (usually 60/70 or 80/100 penetration) is then sprayed hot (350 to 400 deg. F. or 300 to 350 deg. F., depending on the penetration) over the stone by means of power sprayers, to give an even distribution at the rate specified (usually $1\frac{1}{4}$ gall. per sq. yd. for 3 in. and 1 gall. per sq. yd. for 2 in. thickness of stone).

(d) Coarse screenings of the gauge specified is then spread evenly over the grouted stone by fantailing from tipping trucks or hand spreading from piles on the side of the road and rolled with a three-wheeled roller weighing not less than 10 tons. Rolling is continued and additional screenings applied until no more screenings can be forced into the voids in the grouted stone. Screenings are broomed to spread them evenly over the surface.

(e) After a few days, the surface is swept and excess screenings removed. A seal coat of bitumen of the grade specified and at the rate specified (usually 60/70 or 80/100 penetration, at the rate of 1/6 gall. per sq. yd.) is then applied by power sprayers at the temperature specified and fine screenings spread evenly over the surface as specified.

(f) Rolling and brooming is carried out as for the coarse screenings.

COSTS.

(a) Cost of construction of catch drains, subsoil drains cut and fill and preparation of subgrade or formation as for earth roads or for ballasted or broken stone base course.

(b) Bitumen penetration macadam 2 inch consolidated ... ... 7/6 per sq. yd.
Bitumen penetration macadam 3 inch consolidated ... ... 11/6 per sq. yd.

BALLASTED OR BROKEN STONE BASE COURSE.

Base courses can be constructed either in the form of modern Telford ballasted base or Broken Stone base. In either case it is usual to have a depth of from 6 in. to 8 in. consolidated. The base course is constructed to take either penetration or premixed wearing courses and the construction is the same for either type.

Modern Telford Base—Construction.

Subgrade is prepared as for gravel roads.

Spalls of suitable size and material are roughly hand packed as is usual in Telford construction but the spalls are then rolled with a three-wheeled power roller weighing 10 tons. On this is spread a thin layer of coarse screenings of the same material and this is rolled again. The object is to partly fill the voids in the spalls and key the spalls into a tight mass. The spalls are of specified size and shape. Rolling is continued until there is no movement in the base and the surface is reasonably even and true to grade and shape.

Broken Stone Base—Construction.

Subgrade is prepared as for gravel roads.

Broken stone of a gauge specified (usually ½ in. less than the finished depth of base) is spread evenly over the subgrade by tipping trucks and mechanical spreaders or from stock piles on the side of road, by hand.

The stone is then rolled dry with a three-wheeled power roller weighing 10 tons, light applications of coarse screenings of the same material and of specified gauge being applied during the rolling. Rolling is continued until there is no movement under the roller.

Coarse screenings are then applied in layers and rolled until the voids between the base stone are filled.

The surface is then well watered and rolled. Excess screenings in heaps are broken up by brooming and watering and rolling continued until the surface is even, true to shape and presents a rough granular surface.

COSTS.

(a) Modern Telford Base, 8 in. thick (excluding subgrade preparation) ... 14/– to 17/– per sq. yd.

(b) Broken stone Base, 8 in. thick (excluding subgrade preparation) ... ... 10/– to 12/6 per sq. yd.

CONCRETE ROADS (Cement Concrete)

Premixed Concrete Construction.

Complete details are given in specifications for modern concrete roads available at this date. The following is a summary only:

Subgrade is prepared as for gravel roads. Necessary sub-soil drainage and subsidiary works should be complete and the subgrade finished to correct grade and crossfall in accordance with the specifications.

Heavy side forms are then placed in position and secured by spikes or pegs as specified. If kerb and gutter has already been constructed, side forms are unnecessary.

Subgrade between forms is then finally trued up, consolidated by rolling and if specified a sandbed laid on same.

Cement concrete is then mixed and placed in accordance with the specifications, necessary longitudinal and transverse struck during the laying. If reinforced concrete pavement is required, the reinforcing is placed in accordance with the specifications.

On completion of a section, it is finished with mechanical appliances in accordance with the specifications ready for curing.

Curing is then effected as given in detail in the specifications.

Cement Penetration—Construction.

After the excavation of the subgrade is completed, subsoil drainage and subsidiary works carried out, heavy side forms are laid and securely staked into position. If kerb and gutter has already been laid side forms are not necessary.

The subgrade is then finally trued up and consolidated by rolling. If on sand or loose earth, a 2 inch ash bed should be laid.

Between the side forms or the kerb and gutter, coarse aggregate is spread to the required depth on the subgrade and effectively rolled. Coarse aggregate may be watered during rolling if specified or if dusty.

If the slab is to be reinforced, a layer of coarse aggregate is laid between side forms or gutter so that when consolidated by rolling the surface shall be 2 inch below the finished surface of the pavement. Reinforcement is then laid as specified. A second course of aggregate similar to the lower is then laid on the reinforcement and consolidated as before, to give the correct depth of pavement when finished.

Necessary transverse joints are then made by the use of separators placed in the aggregate to finish ½ inch below the completed surface level.

Cement grout is then prepared in specially designed mixers, the usual composition of the grout being:

Sand as specified	...	2½ parts.
Cement as specified	...	1 part.
Water		Not more than 7 gallons per cu. ft. bag of cement.

Grouting is then started at the highest point and thence towards the lowest point alternatively and no grouting is done more than 8 ft. ahead of any ungrouted section. Grouting is continued until all voids and interstices in the coarse aggregate are filled and until there is a slight excess of grout on the surface.

If any expansion or spacing joint boards are used grouting may be done in alternate bays. These boards may be removed before alternate bays are grouted or left in the concrete slab to decay if approved.

Immediately after grouting, the surface is rolled with a roller weighing approx. 2 tons and with a quick reverse motion. Rolling is continued until there is no movement of the coarse aggregate and the surface becomes covered with grout.

Fine aggregate as specified is then spread as evenly as possible over the surface and rolling continued. Surface is then tamped and rolled across the road with a special hand roller, additional fine screenings being added until the surface is even and true and grout covers the surface.

The surface may be finished with rubber squeegees and brooms. If required by specification, after the rubber squeegee has been used and the excess water swept off by the squeegee, a premixed concrete wearing surface may be laid and finished as for premixed concrete pavement.

Curing is effected as for premixed concrete pavements.

COSTS.

(a)	Premixed cement concrete pavement complete on 2 in. sand bed, reinforced with bar mat, dowels and side bars, 6½ in.–9 in. standard	35/– per sq. yd.
	Premixed cement concrete pavement complete on 2 in. sand bed, excluding bar mat, but with dowels and side bars, 6½ in.–9 in. standard	30/– per sq. yd.

(b) Cement penetration concrete pavement complete, reinforced with bar mat dowels, 6½ in.–9 in. standard ... 31/– per sq. yd.
Cement penetration concrete pavement complete but without bar mat, 6½ in.–9 in. standard ... ... 25/– per sq. yd.

FOOTPATHS.

1. **Premixed concrete.**—Constructed in a similar manner to Premixed unreinforced concrete pavement. Small portable concrete mixers are used and the side forms are lighter. Usually concrete is 2½ in. thick.
2. **Cement penetration.**—Constructed in a similar manner to Cement Penetration unreinforced concrete pavement. Small portable grouting machine used and the side forms are lighter. Usually 2½ in. thick with ¾ in. premixed concrete wearing surface.
3. **Gravel-Bitumen Flush Seal.**—Constructed in a similar manner to gravel pavements sealed with a bitumen flush seal coat. Usually 3 in. thick.
4. **Premixed Bitumen.**—Constructed in a similar manner to Premixed Bitumen Pavement but finished with a finer mix of hot asphalt or asphaltic concrete (stone filled) to give a smoother walking surface. Usually 3 in. crushed stone base with ¾ in. premixed top.
5. **Two-coat Bitumen Emulsion or Armour Coat.**—Constructed on prepared base, gravel or crushed rock. Usually one inch consolidated thickness of armour coat.

   Coarse aggregate, usually ¾ in. gauge, is laid evenly on prepared subgrade to give a loose depth of 1 inch. Rolled with hand roller or light footpath roller. Fine aggregate, usually $\frac{5}{16}$ in. gauge, is sprinkled lightly over the surface to fill voids and rolling continued until tight. Penetrate with bitumen and emulsion at the rate of half gallon per sq. yd. of surface. Cover with fine aggregate and roll. Spray ¼ gall. of bitumen emulsion per sq. yd. and cover with ⅛ in. grit, sweep and roll.

COSTS.

1. Premixed concrete—including sand bed 2½ in. thick complete. ... ... 12/– per sq. yd.
2. Cement Penetration—including sand bed 2½ in. thick with ¾ in. premixed top—complete ... ... 9/– per sq. yd.
3. Gravel—Bitumen Flush Seal, excluding gravel base ... ... 2/6 per sq. yd.
4. Premixed Bitumen—excluding base :
   Hot Mix—fine mix—¾ in. thick ... 5/– per sq. yd.
   Asphaltic Concrete—¾ in. thick ... 9/– to 10/– per sq. yd.
5. Two-Coat Emulsion or Armour Coat—excluding base ... ... 3/– to 4/– per sq. yd.

CONCRETE KERB AND GUTTER—COSTS.

The cost of Concrete Kerb and Gutter (Integral) Heavy D.M.R. Standard Pattern 8 inch. kerb, complete... ...	12/– per lin. ft.
Standard 6 inch kerb type, integral kerb and gutter complete	9/– to 10/– per lin. ft.
Concrete Gully Pits (less gratings) ...	£15 per cu. yd. of concrete.

CULVERTS—REINFORCED CONCRETE.

EXAMPLE OF COSTS—LAID COMPLETE—SYDNEY.
Freight, Transport, Cartage and Excavation not included.

Size of Pipes Inches	Cost (at Works) Per Foot	Laying only Per Foot	Nett Cost Per Foot
	s. d.	s. d.	s. d.
12 in. dia.	4/6	3/6	8/0
15 in. dia.	6/–	3/6	9/6
18 in. dia.	7/6	3/6	11/0
21 in. dia.	9/3	4/4	13/7
24 in. dia.	12/–	4/4	16/4
30 in. dia.	17/–	6/2	23/2
36 in. dia.	22/–	9/2	31/2
42 in. dia.	29/–	9/2	31/2
48 in. dia.	35/–	12/3	47/3
54 in. dia.	38/–	12/3	50/3
60 in. dia.	49/–	18/4	67/4

Reinforced Concrete Headwalls.
£16 to £19 per cubic yard of concrete including reinforcement.

Reinforced Concrete Box Culverts (D.M.R. Standard).
£13 to £16 per cu. yd. of concrete including reinforcement.

BRIDGES—COSTS.

Costs.

(a) **Reinforced Concrete Bridges.**

Continuous Girder Type	£5 10s. 0d. per sq. ft. of deck.
Simply Supported Girder Type ...	£4 15s. 0d. per sq. ft. of deck.
Simply-Supported Slab Type ...	£3 15s. 0d. per sq. ft. of deck.

For skew bridges of above types add 25 per cent. to above costs.

(b) **Timber Beam Bridges.**
£55 per lineal ft. based on bridges 20 ft. width between kerbs.

WIRE WORKER

GAL. FENCING WIRE (PLAIN AND BARBED). SPACING TABLE.

Distance apart	NUMBER OF POSTS PER MILE. 9ft.	10ft.	12ft.	14ft.	16ft.	18ft.	20ft.	22ft.	27ft.	36ft.	45ft.
Posts	587	528	440	378	330	293	264	240	196	147	118

GALVANIZED FENCING WIRE.

Table showing Quantity Required per Mile of Fencing.

Gauge	Length per cwt.	Weight required per mile				
		1 Wire	2 Wires	3 Wires	4 Wires	5 Wires
	Yds.	c. q. lbs.	c. q. lbs.	c. q. lbs.	c. q. lbs.	c. q. lbs.
4	269	6 2 4	13 0 8	19 2 12	26 0 16	32 2 20
6	393	4 1 26	8 3 24	13 1 22	17 3 20	22 1 18
8	566	3 0 12	6 0 24	9 1 8	12 1 20	15 2 4
10	882	1 3 27	3 3 26	5 3 25	7 3 24	9 3 23
12	1333	1 1 8	2 2 16	3 3 24	5 1 4	6 2 12

Gal. Fencing Wire,	No. 8	... 42/- per cwt.	...	556 yds.
	No. 10	... 42/- per cwt.	...	882 yds.
	No. 12½	... 45/- per cwt.	...	1333 yds.
Gal. barbed Wire,	No. 12½	... 43/6 per cwt.	...	440 yds.

" CYCLONE " RINGLOCK FENCING.

" Cyclone " Ringlock fencing is stock proof and effectively takes the place of the old-style fence of plain wire and droppers.

The stiff upright wires are held to the line wires by a ringlock. Both upright and lateral wires are given a kink at the junction to make them proof against slipping.

APPROXIMATE PRICES—RINGLOCK FENCE.

8 lines, 30" Height—20/- per chain ; £74 per mile.
6 lines, 28" Height—11/6 per chain ; £42 per mile.

Chain Wire.

2" x 12 Gauge—24", 3/9 yard ; 30", 5/9 yard.
1½" x 12 Gauge—36", 6/- yard.
Steel Fence Posts :—5'-6"—2/3 each.

WIRE NETTING AND FENCES.

When erecting a new wire fence arrange for one of the wires to be 36 in. from the ground, and bore the holes for wire 1 in. from the side of the posts, thus prepare for 42 in. netting, as it will stretch easily and neatly along the fence without bulging round each post.

To prevent netting from corroding dip the roll 6 in. or 7 in. in 2 parts of coal tar and 1 part kerosene, heated nearly to boiling point, and let dry before using. Block and tackle very handy.

GALVANISED WIRE NETTING.

Rolls 50 yards each. Prices subject to fluctuations.

Mesh	Gauge	Width 12″	36″	72″	Price per Roll of 50 yards.
½″	22		58/–		
1″	20		35/–		
2″	19		22/6	45/6	
Rolls 100 yards each.				Width 42″	
1½″	17	27/6	90/6	105/–	

IMPORTED WIRE NETTING.

Galvanised Wire Netting is obtainable from overseas in most of the accepted Australian sizes both for use as rabbit protection, poultry, tennis courts, etc.

It is obtainable from Belgium, France, Germany and Japan. It is the writer's opinion that the best quality comes from Germany. French quality is also good—the Belgian is not quite so good, and Japanese is suspect. It should be discovered by the purchaser that the wire he orders is Galvanised after weaving. Also that he does not purchase in metric sizes, as inch sizes are available from all sources, but sometimes metric sizes are a little cheaper as they do not require special production.

A fair indication of imported prices, would be for 42 x 1½ x 17 Gauge retail price at approximately 86/– per roll of 50 yards. There are ample supplies available, and the purchaser should have no trouble whatever in obtaining his requirements in any size from a reliable importer.

For Supplies See Advertisement, Pages 76 and 77.

Field Gates.

Tubular Steel, braced, with 5 strand cabled wires.
These gates can be made rabbit proof with wire netting.

Sizes—	8ft.	9ft.	10ft.	12ft.	14ft.
	£3 13 6	£3 16 0	£4 1 6	£4 10 0	£5 8 0

Farmyard Gates.

Tubular Steel Braced with 5 strand wire—
Width 4ft., 55/6 ; 5 ft., 61/– ; 6 ft., 77/–.

Tubular Steel with Mesh Wire—
Width, 7 ft., 88/– ; 8 ft., 105/– ; 10 ft., 121/6.

Height 2′—9″ Wrought Iron Gates—With Fittings.—
Double Gates—Width 8 ft., £6 3s. 6d. ; 9 ft., £6 7s. 6d. ; 10 ft., £6 11s. 0d.
Double Gates—Simple Design—8 ft., £5 16s. 0d. ; 9 ft. £5 18s. 0d. ; 10 ft., £6 1s. 6d.
Single Gates, £2 14s. 6d. and £2 11s. 6d.

Manufactured from $\frac{5}{8}$″ and $\frac{1}{2}$″ square iron.—
Wrought Iron Balustrade and Railing from 7/6 per sq. foot.

Tubular driveway gates—
Without Scroll on Top—8 ft., £5 17s. 0d. ; 10 ft., £6 4s. 0d.
With Scroll on Top—8 ft., £6 0s. 0d. ; 10 ft., £6 11s. 0d.

PLAN COPYING AND BUILDING TRADES STATIONERY

PLAN COPYING AND CONTRACTORS' STATIONERY.

When preparing plans for any type of constructional work, you will need either Dyeline or blueprint copies to meet the requirements of all approving authorities.

These prints can be quickly made when the original drawing is prepared on transparent paper. Dark and firm pencil lines will reproduce, but the best results are obtained from Indian ink lines.

Where it is not possible, through lack of time etc. to prepare original plans for copying, working drawings can be prepared for you from Builder's rough sketches by the firm mentioned in Advertisement.

Country work for plan copying is promptly executed, and it is only necessary to post the original drawings.
For quotes see advertisement, page 63.

THE INDUSTRIAL ARBITRATION ACT.

The Industrial Arbitration Act makes it **compulsory** for all employers of labour to keep on their business premises, proper time and pay-sheets, containing specified detailed particulars written up daily, and also to display a copy of Awards affecting all classes of workers employed.

This class of stationery, wages books, time sheets, business Income Tax Recorders, agreement and tender forms are all designed to comply legally with the requirements of the Arbitration Act and other regulations by a firm specializing in this class of printed stationery. For further information, advice and prices see advertisement, page 43B.

BUILDERS' FURNISHING HARDWARE

APPROX. RETAIL PRICES.
FIXTURES AND FITTINGS.

LOCKWOOD ENTRANCE DOOR SETS (complete)—Each.

	No. 310	No. 311	No. 312	No. 313	No. 314
Florentine Bronze (F.B.)	35/–	38/6	40/6	40/–	45/6
Nickel Plated (N.P.) ...	40/–	43/–	45/–	44/6	50/6
Chrome Plated (C.P.) ...	42/6	45/6	48/–	47/6	53/6

LOCKWOOD COMBINATION NIGHT LATCH HANDLE AND KNOCKER.

Florentine Bronze	15/– each.
Nichel Plated	16/– „
Chrome	18/– „

LOCKWOOD DOOR CLOSERS.

No. 400 Nickel	24/– „
No. 401 Iridescent, Bronze or silver	15/– „

LOCKWOOD TUBULAR LATCH (For Interior Doors).

Milford (M.O.) Design, Florentine Bronze Finish	6/– each.
„ „ „ Nickel Plated Finish	7/6 „
„ „ „ Chrome Plated Finish	8/– „

LOCKWOOD PADLOCKS.

225 Padlock, size 1½″	Steel Shackle	...	5/–	each.
225B „ „ „	Brass „	...	5/6	„
227 „ „ 2″	Steel „	...	9/6	„
232 „ „ 1⅛″	„ „	...	11/–	„
232B „ „ „	Brass „	...	11/–	„
234 „ „ 1¾″	Steel „	...	14/6	„
234A „ „ „	Extended „	...	14/6	„
234B „ „ „	Brass „	...	15/–	„
245 „ „ 2″	Brass „	...	18/6	„

LOCKWOOD SASH LIFTS.

1¾″ Oxidised Brass, Without Screws	...	6/6 doz.
1¾″ Florentine Bronze, With Screws	...	7/– „
1¾″ Satin Nickel „ „	...	7/6 „
2½″ Florentine Bronze „ „	...	9/6 „
2½″ Satin Nickel „ „	...	10/– „

Fly Screen Door Hinges—1/6 and 1/9 per pair: Double Action 5/– pair.

SASH CORDS—PER DOZ. YDS.

No.	6	7	8	9	10	12
	3/–	3/6	4/–	5/–	6/–	7/–

Lead Sash Weights 8d. per pound.

FLY GAUZE—ZINC—Per Yard Run.

18″	24″	25½″	26″	27½″	28″	30″
1/8	2/2	2/3	2/6	2/7	2/8	2/9

GAUZE—BRONZE—PER YARD RUN.

24″	28″	30″	36″
7/–	8/–	8/6	10/–

" HURLINGE " DOOR AND WINDOW HINGE.

This new type butt hinge consists of a large and small flap. The small flap fits into the large flap, leaving one thickness of metal. This obviates the necessity for rebating the hinge into door and jamb, and automatically gives the correct sixpenny gap on the hanging stile of the door. Projected lugs " position " the hinge on both door and jamb ensuring correct alignment. About 20 minutes is saved in hanging a door.

Obtainable in 3″ and 4″ sizes at approximately the cost of ordinary butt hinges.

Builders Furnishing Hardware enquiries—See Advertisement, Page 45b.

HOME PURCHASE LOANS.

The Rural Bank is prepared to consider applications for long term loans at 4¼% interest for the following purposes :—

1. Erecting new dwellings.
2. Improving or enlarging existing dwellings.*
3. Purchase of dwellings already erected.
4. Discharging a mortgage or mortgages on dwellings.

* Loans are made for Additions, Alterations, Repairs, Renovations, Re-roofing, Re-decorating, Electricity, Plumbing, Sewerage, Water, Gas, Fencing, Paths, Landscaping, Driveways, Garages and other similar improvements.

For new buildings, plans and specification (approved by the Council) together with tenders are submitted with the loan application.

An advance of up to 80% of the Bank's valuation of the land and building may be made available to approved applicants.

Maximum Period of Repayment.

Brick or Stone buildings	30 years.
Weatherboard and/or Asbestos Cement buildings	20 years.

The Bank may fix shorter periods.

Payment by Instalments.

Loans are repayable by regular monthly instalments which include interest and partial repayment of principal. The regular payment of instalments for the period approved, repays the complete loan in that period.

The borrower has the privilege of repaying the whole of the loan at any time or of paying extra amounts in excess of instalments, for which interest is allowed at the same rate as the loan and when the total of the special repayments, together with the interest thereon, amounts to the balance of the loan, the loan will be automatically discharged.

Table of Monthly Loan Repayments.

Interest calculated at 4¼%.
Period in Years and Monthly Instalments.

Amount £	5 years £ s. d.	10 years £ s. d.	15 years £ s. d.	20 years £ s. d.	25 years £ s. d.	30 years £ s. d.
100 ...	1 17 1	1 0 6	15 1	12 5	10 11	9 11
200 ...	3 14 2	2 1 0	1 10 1	1 4 10	1 1 9	19 9
300 ...	5 11 3	3 1 6	2 5 2	1 17 2	1 12 7	1 9 7
400 ...	7 8 3	4 2 0	3 0 3	2 9 7	2 3 5	1 19 5
500 ...	9 5 4	5 2 6	3 15 3	3 2 0	2 14 3	2 9 3
600 ...	11 2 5	6 3 0	4 10 4	3 14 4	3 5 1	2 19 1
700 ...	12 19 5	7 3 5	5 5 4	4 6 9	3 15 11	3 8 11
800 ...	14 16 6	8 3 11	6 0 5	4 19 1	4 6 9	3 18 9
900 ...	16 13 7	9 4 5	6 15 5	5 11 6	4 17 7	4 8 7
1,000 ...	18 10 8	10 4 11	7 10 6	6 3 11	5 8 5	4 18 5
1,100 ...	20 7 8	11 5 5	8 5 7	6 16 3	5 19 3	5 8 3
1,200 ...	22 4 9	12 5 11	9 0 7	7 8 8	6 10 1	5 18 1
1,300 ...	24 1 10	13 6 5	9 15 8	8 1 0	7 0 11	6 7 11
1,400 ...	25 18 10	14 6 10	10 10 8	8 13 5	7 11 9	6 17 9
1,500 ...	27 15 11	15 7 4	11 5 9	9 5 10	8 2 7	7 7 7
1,600 ...	29 13 0	16 7 10	12 0 9	9 18 2	8 13 5	7 17 6
1,700 ...	31 10 1	17 8 4	12 15 10	10 10 7	9 4 3	8 7 4
1,800 ...	33 7 1	18 8 10	13 10 11	11 3 0	9 15 1	8 17 2
1,900 ...	35 4 2	19 9 3	14 5 11	11 15 4	10 5 11	9 7 0
2,000 ...	37 1 3	20 9 9	15 0 11	12 7 9	10 16 9	9 16 10
2,500 ...	46 6 6	25 12 3	18 16 2	15 9 8	13 10 11	12 6 0

Fees.

The fees payable in connection with applications are as follows :—

Application Fee	£2	0	0
For each inspection and for progress payments (Building Loans)	1	0	0

The **Legal Fees for Mortgage** will be as follows :—

If title under Real Property Act (Torrens Title) :—

Where advance is less than £1,000	£1	11	6
Where advance is £1,000 or over	2	2	0

If title under Old System Freehold :—

Where advance is less than £1,000	£2	12	6
Where advance is £1,000 or over	3	13	6

In cases of complicated titles additional charges may be necessary.

All fees for searching, registration and other out-of-pocket expenses are to be paid by the applicant.

Responsibility for Maintenance.

The borrower must maintain the property in good condition and keep painted all woodwork and ironwork usually painted.

Progress Payments during Construction.

Progress payments are made during the course of erection, following an inspection and based on the amount of work carried out. Inspection must be applied for when the building has reached the following stages :—

Brick buildings :

(*a*) When trenches for footings have been prepared, and reinforcement (if any) placed in position.
(*b*) Immediately after the laying of damp-course.
(*c*) On completion of roof timbers.
(*d*) On completion of dwelling.

Timber-framed buildings :

(*a*) On completion of floor, wall and roof framing.
(*b*) On completion of dwelling.

Standard of Construction.

Plans and specifications embodying the Bank's minimum requirements must be properly drawn up and approved by the local Council. Attention in this respect is particularly invited to the Bank's Schedule of Minimum Standards of Construction which may be obtained from any branch of the Rural Bank.

VOCATIONAL TRAINING COURSES

INTERNATIONAL CORRESPONDENCE SCHOOLS.

The I.C.S. is an educational institution having at its disposal a group of educated, highly trained staff of technicians whose life work is to guide, to teach, to instruct, and to prepare ambitious men and women to look ahead and get ahead—with reasonable certainty.

Studies Commence Without Needless Preliminaries.

Your course can commence at an elementary or advanced grade, according to your present standard of knowledge in the subject. Whether or not your education is extremely limited or advanced ; whether you are employed or preparing for a career ; an individual seeking the way to a better future, or an employer interested in raising the standard of your working force, you can be sure that your problem and your aim will be understood.

Whether the instruction is required to prepare for a professional examination, a vocational need or a spare time hobby the Instructors apply specialised skill in directing the studies of the individual.

Each student is in a class by himself, he fixes his own hours of study, there is no group to keep up with, no slow learner to hold him back. He studies specially prepared texts which lead through the course from the beginning to end in chronological stages avoiding any gaps and leaving no pitfalls. Hundreds of specially made illustrations aid the student in a clear understanding of principles and practices. Throughout the years visual education has been an integral part of the training system. He may ask any number of questions without embarrassment and always has the personal attention of his instructor both in the correction of written work submitted and in additional comment and help in applying his knowledge to practical usage. It is a flexible system that works equally well for the man with limited educational background and for the qualified man who is seeking additional specialised technical training. I.C.S. supply all text books and in studying at home the amount saved in fares and meals in many cases pays for the course.

For details of instruction available refer to Advertisement, Page 52.

INSURANCE

Insurance against various contingencies is an essential part of the costing for all classes of Builder's estimates. Adequate allowance should be made for all the various classes of insurance available, even if not embodied in the specifications. No prudent builder can afford, as an individual, to take risks against which he can protect himself by insurance. In all modern commercial undertakings, Insurance has a priority equal to Banking, so that concurrently with the completion of financial arrangements, the wise business man seeks the assistance of his insurance company to protect his operations and investment. Then there is always the danger of incurring heavy legal expense to defend doubtful claims and even minor mishaps may involve considerable expenses and time in interviewing witnesses, obtaining legal advice etc.

The various classes of insurances to which the builder must give his consideration are: Workers' Compensation, Public Risk, Fire, Personal Accident, Motor Vehicle, Cash in Transit, and Plate Glass, somewhat in the order of their importance.

Workers' Compensation Insurance.

This is the most important insurance cost the builder has to allow for. Insurance is compulsory with heavy penalties for non-compliance. Cover for liability under Workers' Compensation Acts should be definitely secure before employing any labour whatsoever. Liabilities vary in different States and Commonwealth Territories, but under the New South Wales Workers' Compensation Act, 1926-1948, weekly compensation is payable up to three-fourths of the average weekly wages, subject to a maximum amount, with allowances for wife and children. Substantial amounts are specified for various permanent injuries with amounts up to £1,000 for fatal accidents, whilst permanent total disablement may involve unlimited payments of compensation. A very important feature of a recent amendment of the Act makes the employer liable for accidents occurring on the periodical journey to and from work. The total liability of an employer under the Workers' Compensation Act is fully protected by a workers' compensation policy, subject of course to compliance with the conditions of the policy as set out therein. In addition to this liability under Workers' Compensation, most such policies, in N.S.W., include a cover for the sum of £1,000 against liability for claims at Common Law, Compensation to Relatives Act, or the Law Reform Act. Such Common Law liability is incurred when an accident can be attributed to the negligence of the employer, and which includes the negligent acts of the fellow employees of an injured man, also for accidents resulting from defects in the employer's works, ways and machinery. As actions at Common Law are generally undertaken when there appears to be a good chance of securing a verdict for a substantial amount, the limit of £1,000 which includes all law costs and expenses is likely to prove inadequate, so that an increase of the indemnity to £2,500 is recommended. The premium payable for these indemnities is based on estimated wages for a particular job, or over a certain period. Estimates should be reasonably accurate and are adjusted on completion of the job or expiration of the period covered. The amount of wages actually expended must be supplied to

the Insurers, and the premium adjusted thereon by payment of an extra amount or refund as the case may require. A fair original estimate will obviate a perhaps unexpectedly heavy charge on adjustment. Insurers have the right to inspect all wages books, pay sheets and records, with recourse to the Workers' Compensation Commission if necessary.

Sub-contractors.

The New South Wales Workers' Compensation Act, 1926–1948. makes a principal directly responsible to the Sub-contractor's employee. If the sub-contractor fails to meet his liability, the employee may apply direct to the principal, although the latter has the right to be indemnified by the sub-contractor ; should the last-named be a man of "straw." the right may prove illusory. It is therefore incumbent upon the principal contractor to make sure that his sub-contractors have their men properly insured ; mere inquiry is not always sufficient, documentary evidence is most desirable. In case of doubt inclusion in the principal's own policy can be arranged. Brick-layers as sub-contractors present a considerable danger to the builder, as those who supply labour only on a piece-work basis, frequently have no Workers' Compensation Insurance on the men, despite assurances to the contrary. There is even the possibility of liability to the "boss" bricklayer himself, so that the wisest course for the builder is to arrange to include these men in his own policy, and advise his Insurance Company accordingly.

Public Risk Insurance.

The necessity for Public Risk Insurance is becoming increasingly evident to the prudent builder. The general public is growing more and more "claim conscious," and when involved in even a minor mishap, looks around to see from whom compensation may be recovered for loss or injury. Even in the case of accidents where there may be no evidence at all of negligence on the part of the builder, there is always the danger of an action being undertaken by some "claim chaser" on the off chance of securing a verdict. If uninsured, the builder would have to spend valuable time securing evidence for the defence and arranging legal representation, and though the case may be successfully defended it is seldom that costs can be recovered. The liability of a contractor on any ordinary building job is extensive : he may become liable to a member of the general public for damages for any accident due to the negligence of himself or his employees whilst in the performance of duties in his business, or through any defect in his works, ways, machinery or plant. Every caller is a possible claimant, as whilst trespassers and persons present from idle curiosity have very limited rights of action, all callers, who come to the premises for the purpose of work or business in which the occupier has an interest, and upon his invitation, expressed or implied, have very definite rights. So far as such persons are concerned, it is the duty of the occupier to guard them against unusual danger, and neglect in this regard might involve the contractor in an action for damages in the event of an accident. Should children sustain injury on the job, even as trespassers, a successful defence to an action for damages on their behalf might prove difficult. Furthermore, bricks and materials stacked on footpaths constitute a considerable hazard to the general public, whilst damage

can be caused to adjoining property by building operations, or the fall of work partly erected. Motor cars parked nearby are frequently damaged by paint splashed or blown thereon by wind.

One of the most important features of Public Risk Insurance for the builder is that it protects him in connection with the Common Law Liability he has towards the sub-contractor and his employees. As there is always either one or the other on the job during the whole period of construction, the risk is ever present and considerable. The Sub-contractor, the " boss " plumber, the " boss " electrician, and such like, who becomes injured as the result of the negligence of the builder or his direct employees, has the right of action at Common Law the same as any outside member of the public, so has the sub-contractor's employees under similar circumstances. But the matter goes further than that with respect to the latter. Under Section 64 of the N.S.W. Workers' Compensation Act, 1926-48, amounts paid by an insurer for Workers' Compensation to sub-contractor's employees for injuries which can be attributed to the negligence of the builder or his direct employees can be recovered from the builder by the party making such payment. These contingencies are all covered under the Public Risk Policy.

Fire Insurance.

Buildings in course of erection should always be insured against the risk of fire, at the very latest, as soon as the roof timbers are fixed. This is nearly always provided for in the specifications, but as the premium involved is so small, cover should really be effected as soon as any timber is placed on the site of the job. A Fire Policy covering a building in course of erection extends to cover materials on site thereof, so that all timber, window and door frames, and even materials for the building stored in the builder's shed on the site would be included in the insurance. Hence it is unwise to wait until the building is well advanced before securing cover.

Another feature is that frequently an actual policy has to be produced before a " draw " can be made for work done : a last-minute rush to secure a policy may mean quite a delay at an inconvenient moment.

Houseowner's and Householder's Insurance.

This is an increasingly popular form of insurance for Private Dwellings and their contents. The " Houseowner's " applies to the Building, and as well as Fire, Explosion, Lightning and Thunderbolt, includes loss or damage by Earthquake, Riot and Civil Commotion, Aircraft, Bursting, leaking or overflowing of water tanks, apparatus or pipes, Burglary, Housebreaking or any attempt thereat, Houseowner's Liability to the Public, Loss of Rent, Impact by Vehicles, and can be extended to cover Loss or Damage by Storm or Tempest (excluding Flood). The premiums are not much more than those for Fire Insurance only. This class of insurance can also be effected on dwellings in course of erection, but excluding the risk of Burglary and some other contingencies until the building is occupied.

The Householder's Insurance applies to the contents with the same contingencies and including the risk of larceny and theft, with further extensions and some restrictions as set out in the usual proposal form.

Plate Glass Insurance.

Plate Glass may be covered against accidental breakage. The fire risk is included in the usual policy. Whilst a building is being erected or altered, there is always the danger of an employee accidentally bumping the glass with materials or plant, or inadvertently knocking it whilst working in the vicinity. Insurance can be effected for any period that may be required to cover this special builder's risk. The premium is based on the size of the glass, and replacement is made in the event of a claim.

Motor Vehicle Insurance.

The Compulsory Third Party Insurance, which has to be effected before registration of a motor vehicle can be secured, only covers liability for the death or bodily injury to any person caused by or arising out of the use of the vehicle. Cover for liability for damage to another car or property belonging to the public may be secured separately, or is included in the Comprehensive Policy which covers the vehicle itself against loss or damage by Fire, Accident and Theft.

Cash in Transit.

The Pay Roll can be protected against the risk of loss by Theft and/or Highway Robbery. This can be covered up to the amount desired whilst in transit from the Bank in charge of the insured or an employee in the regular service of the insured until delivered to the insured's premises and/or other places of disbursement and whilst there until paid to the Employees.

Personal Accident Insurance.

The Master Builder, the most important man on the job, is often not protected by insurance. The builder can secure similar protection to that provided for his workmen by effecting a personal accident policy. This will afford him weekly payments, together with amounts for Medical and Hospital expenses, for temporary total disablement by accident and capital sums for various permanent incapacities or death. Such insurance has the advantage of operating not only during working hours but for the whole 24 hours daily. All Master Tradesmen can be protected under this class of insurance.

For full particulars regarding cover and rates for the various classes of insurance See Advertisement, Page 33.

FEES AND CHARGES

MINIMUM FEES FOR SURVEY WORK.

The following minimum rates have been adopted by the Institution of Surveyors under the provisions of the Surveyors Act 1929–45.

Field work £7/7/– to £15/15/– per day. Travelling time at daily rates. Car mileage, 9d. per mile—Surveyor's own car.

Identification surveys as required by financial institutions, min. £5/5/–. " Peg-Out " Survey—min. £6/6/–.

All surveys required to be permanently marked.

Out of pocket expenses added.

Country boundary work—basic rate £10/10/– per mile of boundary subject to increase due to nature of country or other difficulties.

ARCHITECTS.

Architect's Fees—1 per cent. of cost of job for sketch plans.
2 per cent. of cost of job for detailed drawings.
3 per cent. of cost of job for supervision.

QUANTITY SURVEYORS.

Fees.—Jobs under £2,000 by agreement.
—£2,000 to £6,000, 1½ per cent. (maximum £75).
—£6,000 to £10,000 1¼ per cent. (maximum £100).
—£10,000 and over, 1 per cent.

TESTING CHARGES.

Where material is required to be tested for certain chemical, mechanical or physical properties there are facilities available to have these tests carried out and the following charges set out an average rate for this type of work.

		£	s.	d.
Physical testing and inspection of metallic materials.				
Cast iron pipes (on value of material tested) ...	per cent.	1	10	0
Cast iron special fittings (on value of material tested)	per cent.	2	10	0
Steel pipes and specials (on value of material tested)	per cent.	4	0	0
Valves (on value of material tested)	per cent.	2	10	0
Steelwork (on value of material tested) ... ... or Cost plus 25 per cent..	per cent.	4	0	0
Tensile, transverse or cold bending of specimens machined ready for test—Single specimen ...	each	1	0	0
Each additional specimen	each		15	0
Izod impact test	each		7	6
Wire ropes	each	2	2	0
Physical testing and inspection of non-metallic materials, concrete, compo., etc.				
Compressive strength of specimens supplied and delivered—single specimens	each	1	0	0
Each additional specimen	each		15	0
If specimens are made from material supplied and delivered—single specimens	each	1	10	0
Each additional specimen	each	1	0	0
Fibrolite pipes (on value of material tested)—per	cent.	2	0	0
Earthenware pipes and fittings	each			2
Roofing Tiles—Transverse breaking strength	each		10	0
Roofing Tiles—Absorption Test	each		10	0
Sand—complete test for suitability for concrete ...	each	3	3	0
Sand—sieve test only			15	0
Other tests, chemical analysis and special investigations are usually charged at actual cost plus 100 per cent.				
Certificates.				
Signed certificates are issued for all work, additional copies charged for at	each		2	0
Minimum charge for each order			5	0

WATER BOARD CHARGES.

For cottages or industrial buildings :—
Bricks at 9d. per 1,000.
Concrete at 2d. per cube yard.
If concrete bricks are used, 2d. per cube yard for concrete plus 25 per cent. on 1/– per square of house area.
Brick cottage (if foundations level) at 1/– per square.
If ready mixed mortar is used, ¾d. per cubic yard.
If ready mixed mortar is used, 25 per cent. reduction on brick charge of 9d. per 1,000.

COUNCIL CHARGES (SUBURBAN).

First 400 square feet, 10/–.
Every additional 400 square feet or part thereof, 10/–.
Maximum fee, £5 0s. 0d.
For alterations and additions to an existing building where cost does not exceed £100, 10/–.
For every additional £100 or part thereof, 2/6.
Maximum fee, £2 1s. 0d.

WATER FOR WORKS.

Concrete—30 gallons per yard cube.
Surface finishing—1 gallon per yard super.
Brickwork—250 gallons per yard rod.
Mortar—50 gallons per yard cube.
Plastering—3 gallons per yard super. (3 coat).
Distempering—$\frac{1}{6}$ gallon per yard super. (per coat).
Whitening—$\frac{1}{6}$ gallon per yard super.
Lime Washing—$\frac{1}{6}$ gallon per yard super.
Add waste, say 25 per cent.

MEASUREMENTS AND WEIGHTS OF COINS.

A bronze halfpenny measures exactly 1 inch in diameter—5 equal 1 oz.

A bronze penny measures exactly 1·2 inch in diameter—3 equal 1 oz.

A florin and a sixpence weigh $\frac{1}{2}$ an ounce.

Term penny as applied to nails—
Three penny means 3 pounds to 1000 nails.
Eight penny means 8 pounds to 1000 nails.

The diameter of a circle multiplied by ·8862 equals side of equal square in area.

The diameter of a circle multiplied by ·7071 equals side of inscribed square in circle.

The side of a square multiplied by 3·545 equals circumference of a circle of equal area.

The circumference of a circle multiplied by ·2821 equals side of a square of equal area.

The diameter of a circle multiplied by 3·1416 equals circumference.

PLANT AND TOOLS

CONTRACTOR'S MACHINERY AND EQUIPMENT.
CONCRETE MIXERS.

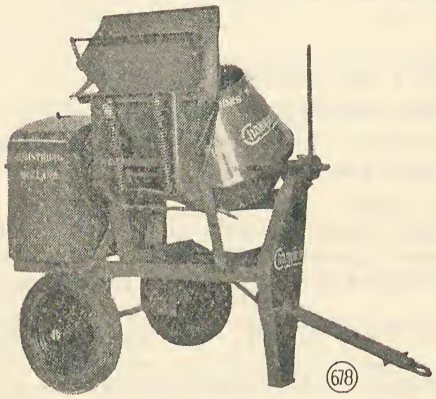
It is recommended that the various capacities of the Mixers described are carefully studied in order to obtain the utmost output of mixed concrete with the minimum of labour to enable the contractor to show reasonable returns for the work executed.

Hand operated or Belt Driven Mixer.

The " Champion " Concrete Mixer of 3 cub. ft. capacity is normally a hand operated machine, but the handwheel is actually a flat pulley to enable the belt drive to be attached to a stationary engine or the belt pulley on a Tractor, and is generally used on Stations, Farms, etc., for small concrete work, where time is not an objective. This Mixer is of the Tilting Drum Type, and is designed to tilt both ways. Approximate price, £170 0s. 0d.

Mixers for Small Contractors.
3 cub. ft. capacity.

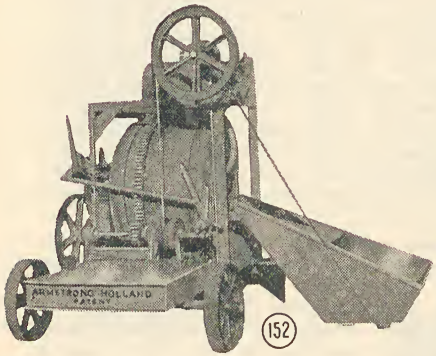
In small contracting work, Mixers of 3 cub. ft. capacity are generally used. The most popular type today is manufactured as a Trailer unit (Fig. 678) the undercarriage being spring mounted and fitted with either solid or pneumatic tyres. A telescopic drawbar is provided for towing behind car or truck enabling the mixer to be moved to numerous jobs at short notice. The Patent Recoil Spring Loader attached to the side of the Mixer enables a batch to be compiled whilst the previous one is being mixed, thereby greatly increasing the output of the machine. These Mixers have been proved to be able to handle dry materials or wet mixtures with an average slump and to mix mortar quite satisfactorily. Approximate price, £240 0s. 0d.



678

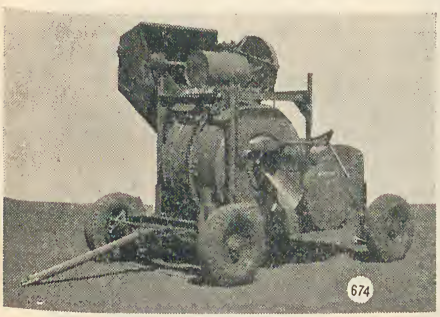
Larger Capacity Mixers.

For construction work where a large and continuous output of concrete is necessary, Mixers of 5, 7, 10 and 15–cub. ft. capacities are generally favoured. The 5 and 7–cub. ft. Mixers are known as one paper bag type machines (Fig. 152) and are designed with a Power Loader so that sand, metal, cement, etc., can be loaded by Barrows or rickshaws at ground level and when the Loader is elevated the contents are discharged into the non-tilting type mixing drum. Water is added from a Pressure Type Water Tank on the top of the Mixer and the amount required can be predetermined by setting a discharge valve on the side of the tank.



The 10–cub. ft. Mixer is recognised as a two-bag Machine and the 15–cub. ft Miixer as a three Bag Machine (Fig. 674).

For the largest construction work, Mixers of this type are manufactured in sizes ranging from 21-cub. ft., 30-cub. ft. (1 Yard) and up to two yard or 54-cub. ft. These are favoured for dam construction and other types of Water Conservation work, or in jobs where a complete cycle is maintained in concrete pouring until the job has been completed.

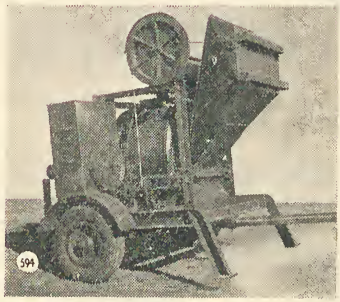


Machines are made with either Power Operated Loaders or Batch Hoppers. In the mixing of concrete where one yard or two yards is required per batch, a Mixer of the Tilting Drum Type has been used on many occasions. We have an example of the work undertaken by several Tilting Drum Type Mixers in the construction of the Captain Cook Graving Dock. Normally two or more of this type, depending on the output required, are used in conjunction with a batching plant and mounted concentrically for rapid feeding and discharge. The aggregate which is elevated into bins can then be controlled by valves and the required mix discharged into a weighbatcher. When the required mix is in the batcher, e.g., 4–2–1 or as specified, the complete charge is fed into the conical shape Mixer through a swivel head and the requisite amount of water added from a separate

water batcher. The charging head can then be swivelled to line up with the second or third Mixer. The complete cycle of batching, mixing and discharge is not more than ninety seconds. Many of these plants are fully automatic and the mixture required is obtained by setting a series of control valves and the result is a complete batch of mixed concrete ready for placing either by hopper car, dump truck, etc.

Machines of similar capacities can be obtained with a Batch Hopper fitted in place of the Power Loader. This arrangement lends itself to construction work where an excavation can be made for the Mixer or where a Machine is set up in the basement of a building, and the materials can be fed from Rickshaws or Barrows directly into this Hopper. It is also ideal for mounting under aggregate bins where material can be discharged directly into the Hopper. Water is fed in the normal way from the Pressure Tank as has been previously outlined.

For Contractors who require a Machine which can be moved to various sites without the necessity of loading on a float, the one bag Mixer of 7-cub. ft. has been designed for attaching to a truck and semi-elliptic springs and heavy duty tyres ensure that the machine can be towed for unlimited distances quite safely. The fixed legs on the front of the machine are clear of the ground when in the towing position, and when the machine is working the two legs at the real of the machine are adjusted to take the weight of the Mixer and its load off the springs and tyres. Approximate price is £1000 0s. 0d.



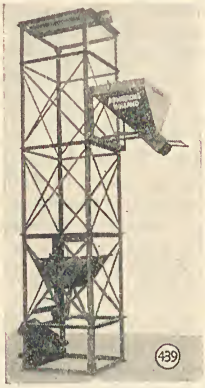
This 7-cub. ft. Mixer is driven by a 6 H.P. Totally Enclosed Petrol Kerosene Engine through machine cut gears and a clutch is provided on the end of the countershaft to enable the engine to be started without a load.

In small general contracting work, the contents of the Mixers of 3 cub. ft. capacity are generally discharged into Concrete Barrows especially designed so that in wheeling the wet concrete will not be spilt. The trend today is to fit all Concrete Barrows with Pneumatic Tyred Wheels, as it has been found that this type of barrow is unequalled in surmounting obstacles without spilling and as the axles are fitted with either roller or ball races, a minimum of effort is required in wheeling the Barrow.

The capacity of the barrow tray is 2-3 cub. ft. wet concrete and 4 cub. ft. dry material. Approximate price, £15 0s. 0d.

For larger Mixers where it is desired to minimise handling the two-wheel concrete cart commonly called a rickshaw is employed. These are manufactured with steel wheels, but the modern trend is to equip these with Pneumatic Tyres and Roller Bearings which in turn cushion the load and decrease the effort required to handle same. Approximate prices £51 0s. 0d.

Where it is necessary to construct a building over one floor in height, the all steel concrete Tower is unequalled for easy handling. A one-bag Machine or larger is generally used to mix the concrete and discharge same into a tower bucket which is then hoisted and is tilted by the aid of cams into a Tower Hopper and the contents of same distributed where required at the requisite height (Fig. 439) by barrows or carts.

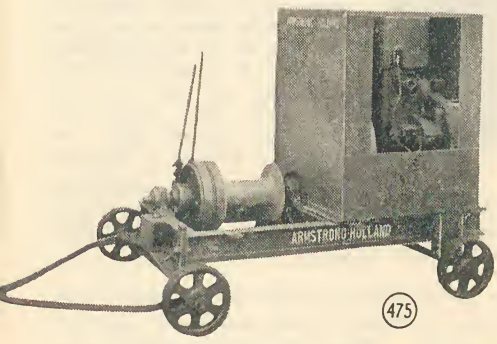

439

The Steel Towers are made in 10-ft. lengths which require four verticals, eight cross pieces and eight diagonals together with the top and bottom steelwork for supporting the Tower proper and the head sheaves for rope guides, etc.

Where the Tower is to be used for hoisting material, a cage is used which is large enough to take two concrete barrows. When the tower is used directly for hoisting, a concrete tower bucket, as previously described, of the balance type, is used which will not tilt until in contact with the cams placed at the required height for discharge.

In construction work of not more than two or three floors, a popular method is the sheer legs which are rigged with a rear and a fore stay to allow a movement of 14″ so that when hoisting a barrow of concrete or bricks, the load is clear of the face of the building and on arriving at the landing there is sufficient slack to allow the load to swing back.

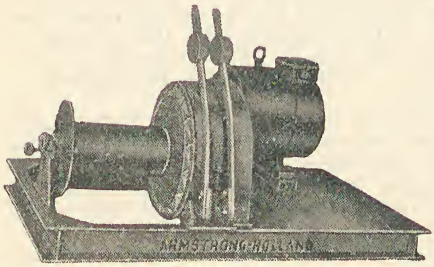
In this type of rig a small Petrol Engine driven Hoist is generally favoured to lift the barrow of bricks or cement at an approximate speed of 120 F.P.M. The Hoist itself is equipped with a 6 H.P. Vertical Totally Enclosed Petrol Engine which drives a planetary gear type drum. This means that whilst the main axle of the drum is revolving, the drum itself is stationary, but immediately the clutch band is brought into operation the spider on the axle is made to drive the planetary pinions which in turn engage with an integral gear ring and the drum is revolved in the opposite direction to the main axle.



475

On reaching the top of the ‘ Hoist ’ the clutch is disengaged and the load held in position by the brake band and the brake used to lower to ground level. The rope recommended for hoisting a load is $\frac{5}{16}$″ diameter, and it is not a good practice to wind more rope than is actually required on to the drum of the hoist, as the tendency is for the rope to squash under load and a piled up rope on the drum throws undue stress on the engine.

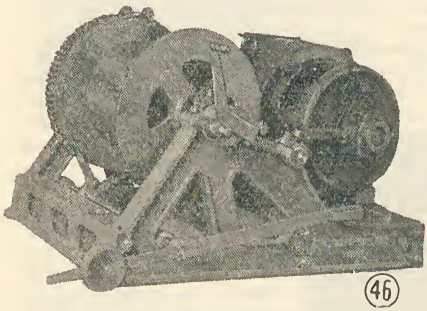
When Mixers of 1, 2 and 3 bag are used, the general practice is to use a Tower Bucket and Hopper. To operate the Bucket a Planetary Gear Type Hoist is favoured with an Electric Motor or Power unit, depending on the location of the job. When using an electric motor, it is recommended that a 10 or 15 H.P. 950 R.P.M. Motor be used. The first will give a hoisting speed of 150 ft. per minute and the latter 200 ft. per minute, depending on the load, which should not exceed 15 cwt. on a single line.



206

In this type of Hoist, the drum is stationary on a moving axle until such time as the clutch is engaged. The load can be lowered by the drum free wheeling and being checked by the brake. The wire rope normally used for this load is ½".

For High Speed Hoisting, a unit, as illustrated in Fig. 46, is generally favoured. This Hoist can be fitted with a Petrol Power Unit or an Electric Motor and is driven from a Pinion on the Power Unit Shaft through an Idler Gear to the Main Driving Gear on the Drum Axle. The Drum is operated by a quick acting Screw and Double Cone Friction Type Clutch. For lowering a counterweighted foot action brake is provided which is of the self-energising type. A Capstan is also provided on the end of the main axle, and is in operation whilst ever the Motor or Engine is running.


46

Hoisting speeds vary from 300 to 400 ft. per minute, depending on the size of the Motor or Engine used. Generally it is recommended that a 20 or 25 H.P. 950 R.P.M. Electric Motor or Engine of the same capacity be fitted.

Where it is necessary for contractors to lift heavy loads or for pile driving, a Hoist capable of lifting 2 tons direct is employed. This Hoist can be operated by a Power Unit of 25 H.P. or an Electric Motor. All Gears are machine cut and Drum is 10" in diam. with large Flanges to allow maximum rope to be wound. This type of Hoist operated with a quick screw thrust which engages the Drum on a Friction Cone which is fitted to the gear on the main drum spindle.

The Brake is operated by a counterweighted foot or hand paddle, and is of the self-energising type. This type of Hoist can be supplied in the Double Drum type if required. The principle of operation being the same and is favoured where a ' Drag Line', ' Flying Fox ' etc. is being used and also when in pile driving it is necessary to hold a load on one Drum and Hoist or work the ' Monkey ' with the other. A rack and Pawl can be fitted to the single Drum or Double Drum Hoist if required.

For further information See Advertisement, Page 11.

N.C.L. " Universal " Wood-working Machine.

The machine is of the radial ram type, thus obviating any overhanging members in front of the saw or cutter head.

All slideways are effectively sealed against entry of dust or other foreign matter and scrapers are fitted to contact top side of slideways to prevent pack-up of sawdust and resins.

The ram, on which is carried the work head and motor assembly, runs on twelve double row self-aligning ball bearings which may be adjusted without removing any portion of the machine. Movement of the ram requires a minimum of effort, a most important feature in a machine of this nature. The ram has a 26″ stroke which will allow for mitre cutting on 18″ wide board.

The motor is a special low centre type, and allows maximum depth of cut of 5″ when using an 18″ dia. saw. The motor, rated at 5 H.P. is wired for 3 Ph., 415V, 50 cycle, A.C. Spindle speed is 2850 R.P.M., and motor is fan cooled.

The motor may be turned through 360° in two planes for operations such as straight cutting off, angle and double angle cuts, trenching, dadoing, shaping, routing, spindle moulding, ripping, bevel ripping, panel raising, etc.

The work head is double compounded so that when making angle or double angle cuts, the tools may be adjusted either in a vertical direction, or in the same direction as angle of cut, which is a highly desirable feature in some classes of work.

For straight ripping, the saw can be set parallel with the cross-cutting fence and locked at the desired distance relative to the fence.

With the ram fully extended, and the saw in the rip position, a throat opening of 4′ 2½″ is available, allowing sheets up to 8′ long to be halved.

All necessary adjustments may be made from in front of the machine and necessitate no climbing over or under work-table.

Overall Height 5′–7″—Approx. Weight (uncrated), 7 cwt.

,,	Length (front of table to end of ram)	6′–10″
,,	Width (including work-table)	5′–6″
,,	,, (less work table)	2′–1″
Height of work-table from Floor Level		3′–2″

Maximum Saw Dia., 18″—Maximum Depth of Cut, 5″.

Vertical Adjustment on Saw, 9″—Approximate price, £405.

See Advertisement, Page 54.

LADDERS.

CARTAGE AND FREIGHT TO BE ADDED.

Bound Oregon Scaffold Planks, 6/- per foot.

Extension Ladders—Oregon

	£	s.	d.
7/12′	4	15	0
8/14′	5	8	0
9/16′	6	2	0
10/18′	6	15	0
11/20′	7	4	0
12/22′	8	2	0
13/24′	8	16	0
14/26′	9	9	0
15/28′	11	5	6
16/30′	12	0	0
17/31′	12	15	0
18/32′	13	10	0
19/34′	17	2	0
20/36′	18	0	0
21/38′	18	18	0
22/40′	19	16	0
23/42′	20	14	0
24/44′	21	12	0
25/46′	22	10	0
26/47′	26	0	0
27/48′	27	0	0
28/50′	28	0	0

Builders' & Painters'—Wirebound Ladders—Oregon

6′	2	7	0
8′	3	2	0
10′	3	18	0
12′	4	14	0
14′	5	8	6
16′	6	4	0
18′	7	0	0
20′	7	15	0
22′	11	0	0
24′	12	0	0
26′	13	0	0
28′	14	0	0
30′	15	0	0

Shelf Ladders—Oregon

5′	2	5	0
6′	2	14	6
7′	3	3	0
8′	3	12	6
10′	4	10	6

Builders' Heavy Ladders—Oregon

16′	9	0	0
18′	10	0	0
20′	11	0	0
22′	12	2	0
24′	13	4	0
26′	14	6	0
28′	15	8	0
30′	16	10	0

Builders' Steps—Oregon

4′	2	14	0
5′	3	7	0
6′	4	0	0
7′	4	13	0
8′	5	6	0
10′	7	0	0
12′	8	10	0
14′	10	3	0

House Steps—Oregon

3′	1	14	0
4′	2	0	0
5′	2	10	0
6′	3	0	0
7′	3	10	0
8′	4	10	0

Extension Steps—Oregon

5′	3	10	0
6′	4	5	0
7′	4	18	6
8′	5	12	0
10′	7	0	0

Platform Steps—Oregon

5′	5	15	0
6′	7	0	0
7′	8	0	0
8′	9	5	0
10′	11	10	0
12′	14	0	0
14′	16	2	0
16′	18	8	0

Steel Hinge Steps—Oregon—(Senior)

4′	3	10	0
5′	4	8	0
6′	5	5	0
7′	6	5	0
8′	7	0	0
9′	7	18	0
10′	8	15	0
12′	10	10	0
14′	12	10	0
16′	14	0	0
18′	15	15	0

Orchard Steps—Oregon (Standard)

6′	4	0	0
7′	4	11	0
8′	5	5	0
10′	6	10	0

Bucketboard Steps—Oregon

5′	3	15	6
6′	4	10	0
7′	5	5	6
8′	6	0	0

Double-Sided Shop Steps—Oregon

2′–6″	3	3	0
3′–4″	3	18	0
4′–2″	4	16	0
5′–0″	5	8	0
5′–10″	6	5	0
6′–8″	6	18	0

Trestles—Oregon

6′	6	15	0
7′	8	0	0
8′	9	0	0
10′	11	5	0
12′	13	10	0
14′	15	15	0
16′	18	0	0

Folding Step Ladder Stools—Oregon—(Senior)

2′	2	0	0
3′	2	5	0

TIMBERS FOR BUILDING PURPOSES

DIVISION OF WOOD TECHNOLOGY,
FORESTRY COMMISSION OF NEW SOUTH WALES.

New South Wales possesses a very large number of building timbers some of which are not available in large quantities, although they may be milled and used with very satisfactory results in those districts in which they occur. Occasionally such timbers may find their way on to the Sydney market, and the fact they are not listed herewith, does not in any way indicate that they are necessarily inferior to those which are mentioned.

Under the heading of " Principal Timbers " are listed those woods which are usually readily available on the Sydney market, whilst under the caption " Other Suitable Timbers " are given certain woods which are used locally but which are not always readily obtainable elsewhere. Possible sources of supply of any of the woods listed can be furnished on request.

There are a number of timbers not listed but which are quite satisfactory for various building purposes. They are not listed because of the small quantities offering and the lack of continuity of supply.

The common names given are those agreed upon by the Standards Association of Australia and issued as a Draft Australian Standard, and it is urged that these names, preferably accompanied by the botanical names, should be used. It should be realised that the same timber may be known in different districts by entirely dissimilar names, and if there is any confusion with regard to nomenclature, or doubt as to the suitability of a local timber for the required purpose, the Division of Wood Technology should be consulted.

All the timbers mentioned are available for inspection at the Division of Wood Technology, 96 Harrington Street, Sydney. Descriptions of their properties and uses can be had from the descriptive cards available from the Division. Illustrations of many of them are contained in R. T. Baker's " Hardwoods of Australia." This work can be consulted at any public library.

SECTION A. FLOOR JOISTS AND BEARERS.

Principal Timbers :

Blackbutt	Eucalyptus pilularis
Tallowwood	,, microcorys
Sydney Blue Gum	,, saligna
Spotted Gum	,, maculata (Sapwood should on no account be permitted).
White Cypress Pine	Callitris glauca

Other Suitable Timbers :

White Stringybark	Eucalyptus eugenioides
Brown Stringybark	,, capitellata
Yellow Stringybark	,, muelleriana
Red Mahogany	,, resinifera
White Mahogany	,, acmenioides

SECTION A. FLOOR JOISTS AND BEARERS

OTHER SUITABLE TIMBERS.

Brush Box	Tristania conferta
Grey Gum	Eucalyptus punctata
	,, propinqua
Forest Red Gum	,, tereticornis
River Red Gum	,, rostrata
Alpine Ash	,, delegatensis
	,, gigantea
Mountain Gum	,, dalrympleana
Bangalay	,, botryoides
Woollybutt	,, longifolia
Brown Barrel	,, fastigata
Ironbark	,, paniculata
	,, siderophloia
	,, crebra
Silver-top Ash	,, sieberiana
Narrow-leaved Messmate	,, phellandra

SECTION B. WALL FRAMING.

(Same as for Section A.)

Care should be taken to select straight grained timber especially in Brush Box (*Tristania conferta*).

SECTION C. ROOF FRAMING.

(Same as for Section A.)

Care should be taken to select straight grained timber especially in Brush Box (*Tristania conferta*).

SECTION D. FLOORING.

Principal Timbers :	
Tallowwood	Eucalyptus microcorys
Blackbutt	,, pilularis
Sydney Blue Gum	,, saligna
White Cypress Pine	Callitris glauca
Other Suitable Timbers :	
Brush Box	Tristania conferta
Turpentine	Syncarpia laurifolia
Red Mahogany	Eucalyptus resinifera
White Mahogany	,, acmenioides
White Stringybark	,, eugenioides
Brown Stringybark	,, capitellata
Yellow Stringybark	,, muelleriana
Spotted Gum	,, maculata (Sapwood on no account should be permitted)
Ironbark	Eucalyptus paniculata
	,, siderophloia
	,, crebra

SECTION D. FLOORING.
OTHER SUITABLE TIMBERS.

Grey Gum	Eucalyptus punctata
	,, propinqua
Forest Red Gum	,, tereticornis
River Red Gum	,, rostrata
Alpine Ash	,, delegatensis
	,, gigantea
Mountain Gum	,, dalrympleana
Obliqua	,, obliqua
Narrow-leaved Messmate	,, phellandra
White Ash	,, fraxinoides
Bangalay	,, botryoides
Woollybutt	,, longifolia
Brown Barrel	,, fastigata
Silver-top Ash	,, sieberiana
Hoop Pine	Araucaria cunninghamii
Brush Mahogany (Red Carabeen)	Geissois benthami
Coachwood	Ceratopetalum apetalum
Sassafras	Doryphora sassafras
Silver Sycamore	Cryptocarya glaucescens
N.S.W. Walnut	Endiandra virens
Crow's Ash	Flindersia australis

SECTION E. WEATHERBOARDS.

Principal Timbers :

Red Mahogany	Eucalyptus resinifera
Sydney Blue Gum	,, saligna
White Cypress Pine	Callitris glauca
Blackbutt	Eucalyptus pilularis
Tallowwood	,, microcorys

Other Suitable Timbers :

Bangalay	Eucalyptus botryoides
White Mahogany	,, acmenioides
Brown Barrel	,, fastigata
White Stringybark	,, eugenioides
Brown Stringybark	,, capitellata
Yellow Stringybark	,, muelleriana
Alpine Ash	,, delegatensis
	,, gigantea
Mountain Gum	,, dalrympleana
Spotted Gum	,, maculata (Sapwood on no account should be permitted)
Ironbark	Eucalyptus paniculata
	,, siderophloia
	,, crebra

SECTION F. SILLS. Principal Timbers :

Tallowwood	Eucalyptus microcorys
Red Mahogany	,, resinifera
Blackbutt	,, pilularis
Other Suitable Timbers :	
Sydney Blue Gum	Eucalyptus saligna
Forest Red Gum	,, tereticornis
Spotted Gum	,, maculata (Sapwood on no account should be permitted)
Ironbark	Eucalyptus paniculata
	,, siderophloia
	,, crebra
White Stringybark	,, eugenioides
Brown Stringybark	,, capitellata
Yellow Stringybark	,, muelleriana
Grey Gum	,, punctata
	,, propinqua

SECTION G. LININGS AND CEILINGS. Principal Timbers :

Hoop Pine	Araucaria cunninghamii
White Cypress Pine	Callitris glauca
Scented Satinwood (Coachwood)	Ceratopetalum apetalum
Red Mahogany	Eucalyptus resinifera
Blackbutt	,, pilularis
Sydney Blue Gum	,, saligna
Other Suitable Timbers :	
Silver Sycamore	Cryptocarya glaucescens
Sassafras	Doryphora sassafras
White Mahogany	Eucalyptus acmenioides
Silver Ash (Cudgerie)	Flindersia schottiana
Alpine Ash	Eucalyptus delegatensis
	,, gigantea
Mountain Gum	,, dalrympleana
Brush Mahogany (Red Carabeen)	Geissois benthami
Bangalay	Eucalyptus botryoides
Rose Mahogany (Rosewood)	Dysoxylum fraseranum
Rose Maple (Pigeonberry Ash)	Cryptocarya erythroxylon

SECTION H. JOINERY. Principal Timbers :

Hoop Pine	Araucaria cunninghamii
Coachwood	Ceratopetalum apetalum
Alpine Ash	Eucalyptus delegatensis
	,, gigantea
Mountain Gum	,, dalrympleana
Red Cedar	Cedrela toona var. australis
Sassafras	Doryphora sassafras
Silver Ash (Cudgerie)	Flindersia schottiana

SECTION H. JOINERY.

Other Suitable Timbers :

White Beech	Gmelina leichhardtii
*Bollywood (Bolly Gum)	Litsea reticulata
*Mountain Gum	Eucalyptus dalrympleana
*Messmate Stringybark	,, obliqua
N.S.W. Messmate	,, phellandra
Mountain Ash	,, regnans
*Brown Barrel	,, fastigata
White Stringybark	,, eugenioides
Rose Gum	,, grandis
*Manna Gum	,, viminalis
Brush Mahogany (Red Carabeen)	Geissois benthami
Rose Mahogany (Rosewood)	Dysoxylum fraseranum
*Rose Maple	Cryptocarya erythroxylon
Black Cypress Pine	Callitris calcarata
Silver Sycamore	Cryptocarya glaucescens
N.S.W. Walnut	Endiandra virens
*White Birch	Schizomeria ovata
*Yellow Carabeen	Sloanea woollsii
*Blush Tulip Oak	Tarrietia actinophylla

*These timbers must be free of sapwood or so treated as to render them immune from the attack of the Powder Post Borer.

SECTION I. PLYWOOD AND VENEERS. Principal Timbers :

Hoop Pine	Araucaria cunninghamii
Scented Satinwood (Coachwood)	Ceratopetalum apetalum
Silver Ash (Cudgerie)	Flindersia schottiana
Black Bean	Castanospermum australe
Rose Maple (Pigeonberry Ash)	Cryptocarya erythroxylon

Other Suitable Timbers :

Flooded Gum	Eucalyptus grandis
Alpine Ash	,, delegatensis
	,, gigantea
Rose Mahogany (Rosewood)	Dysoxylum fraseranum
Silver Sycamore	Cryptocarya glaucescens
Sassafras	Doryphora sassafras
N.S.W. Walnut	Endiandra virens
Blush Tulip Oak (Booyong)	Tarrietia actinophylla
Brush Mahogany (Red Carabeen)	Geissois benthami
Bolly Gum	Litsea reticulata
Silver Quandong (Blue Fig)	Elaeocarpus grandis

Some of these timbers are not always readily available ; in addition other woods are often veneered when they show distinctive figure.

DENSITY OF SOME COMMERCIAL AUSTRALIAN TIMBERS.

Botanical Name	Common Name	Dry Wt. cu. ft. Pounds	Green Wt. cu. ft. Pounds
Acacia melanoxylon	Blackwood	68	75
Agathis palmerstoni	Queensland kauri	30	40
Araucaria cunninghamii	Hoop Pine	34	43
Callitris calcarata	Black Cypress Pine	40	45
Callitris glauca	White Cypress Pine	43	49
Cedrela toona var. australis	Red Cedar	30	49
Ceratopetalum apetalum	Scented Satin-wood	39	55
Cryptocarya erythroxylon	Rose Maple	42	62
Doryphora sassafras	Sassafras	37	54
Dysoxylum fraseranum	Rose Mahogany	45	68
Elaeocarpus grandis	Silver Quandong	29	46
Eucalyptus acmenioides	White Mahogany	60	78
,, bosistoana	Coast Grey Box	68	78
,, capitellata	Brown Stringy-bark	56	70
,, crebra	Red Ironbark	68	73
,, dawsoni	Slaty Gum	65	—
,, diversicolor	Karri	56	75
,, eugenioides	White Stringy-bark	51	68
,, gigantea	Alpine Ash	41	71
,, globulus	Southern Blue Gum	58	74
,, goniocalyx	Mountain Grey Gum	55	72
,, grandis	Rose Gum	49	56
,, hemiphloia	Grey Box	63	73
,, maculata	Spotted Gum	58	76
,, marginata	Jarrah	51	70
,, microcorys	Tallowwood	61	79
,, muelleriana	Yellow Stringy-bark	54	74
,, obliqua	Messmate Stringybark	47	63

DENSITY OF SOME COMMERCIAL AUSTRALIAN TIMBERS.

Botanical Name	Common Name	Dry Wt. cu. ft. Pounds	Green Wt. cu. ft. Pounds
,, paniculata	Grey Ironbark	68	75
,, phellandra	N.S.W. Messmate	47	70
,, pilularis	Blackbutt	58	75
,, propinqua	Grey Gum	66	75
,, punctata	,, ,,	69	78
,, resinifera	Red Mahogany	63	76
,, rostrata	River Red Gum	56	70
,, redunca	Wandoo	68	80
,, robusta	Swamp Mahogany	55	75
,, saligna	Sydney Blue Gum	57	72
,, siderophloia	Broad Leaved Ironbark	71	80
,, sideroxylon	Red Ironbark	65	76
,, sieberiana	Silvertop Ash	62	72
,, tereticornis	Forest Red Gum	64	81
,, viminalis	Manna Gum	51	74
Endiandra palmerstoni	Queensland Walnut	45	—
Flindersia brayleyana	Queensland Maple	40	—
Flindersia oxleyana	Yellowwood	47	59
,, australis	Crow's Ash	68	82
Geissois benthami	Brush Mahogany	38	56
Grevillea robusta	Southern Silky Oak	38	70
Litsea reticulata	Bollywood	32	50
Nothofagus cunninghamii	Tasmanian Myrtle		
Pinus radiata	Radiata Pine	32	62
Pseudotsuga taxifolia	Douglas Fir	35	40
Schizomeria ovata	White Birch	39	59
Sloanea woollsii	Yellow Carabeen	36	53
Syncarpia laurifolia	Turpentine	61	73
Tarrietia actinophylla	Brush Tulip Oak	51	68
Tristania conferta	Brush Box	56	75

INSECT PESTS IN TIMBER

CONTROL OF INSECT PESTS IN BUILDING TIMBER.

These insects are divided into four main groups :—

(1) White Ants (Termites). (2) Pin Hole Borers.

(3) Powder Post Borers (Lyctus). (4) Furniture Borers (Anobium).

Termites work from a colony, usually situated in the soil, and make their entry by building mud-covered galleries over or through cracks in the foundations.

They work inside boards making long, completely enclosed galleries and gradually reducing a board to a thin shell. Their attack may be prevented by placing termite caps over the foundations.

The eradication of termites, or their control once they are established in the building, is effected by introducing finely powdered white arsenic or Paris green into the galleries where they are working. Extreme care should be taken in introducing these powders to disturb the termites as little as possible and to seal the holes made to exclude light and air after treatment.

Pin Hole Borers attack the living tree, the log or green timber. The holes are drilled at right angles to the grain, are straight and usually the sides of the holes are stained black. Since the insects depend on a fungus, which depends on moisture in the timber, they will not do any further damage in seasoned timber.

Powder-Post Borers (*Lyctus spp.*) are the major problem in Australian building timbers. They attack the sapwood of a large proportion of the hardwoods and the brushwood species, often referred to as softwoods.

In the hardwoods, the sapwood is not very thick, but in the brushwoods it may be three inches or more in thickness.

These borers attack the timber when it is seasoned or partly seasoned, by laying their eggs in the pores. The grubs work inside the wood, up and down the grain, filling their tunnels with very fine powdery dust and pushing out little heaps of the dust from the affected wood. This fine dust makes *Lyctus* easy to distinguish from other types of borers.

When holes appear in Lyctus-infested wood it means that the beetle, having passed through its life cycle, has emerged from the wood preparatory to laying eggs in another piece. The sides of the holes are quite clean, not stained as are those of the Pin-hole Borers.

The preservation of timber against *Lyctus* is generally carried out by treatment with boric acid which will be discussed later on.

To eradicate *Lyctus*, treat with a mixture of Paradichlor-benzene and kerosene (1 oz. dissolved in 1 pint). This is recommended for general use. For structural timbers where there is no objection to staining of the wood, creosote and kerosene mixed in any proportion, from equal parts to one in 9, is a more effective mixture.

The Furniture Borer (*Anobium*), commonly found in the pine timbers, notably New Zealand White Pine, Hoop Pine and Kauri, is not a very great problem for the builder. It usually appears several years after a house has been built, but once established in the house should not be regarded lightly.

The life cycle of this borer is similar to that of *Lyctus* in that the eggs are laid in cracks and crevices around the wood and no sign of attack is seen until the beetle emerges some one or two years later.

Preservation to prevent *Anobium* attack is not recommended because it is difficult to know when its attack is likely to occur, and to prevent the attack it would be necessary to treat every piece of timber going into a house.

For the eradication of *Anobium*, removal of the affected boards is recommended, and then thorough spraying with the mixtures as suggested for *Lyctus*.

The Preservation of Timber.

The preservation of timber may be divided into two different sections.

(1) Timber which is to see service exposed to the elements.

(2) Timber used under cover, flooring, mouldings and furniture, etc.

The first include fence posts, telephone poles, railway sleepers, bridge timbers, etc.

The most satisfactory treatment is impregnation with creosote. It has been the practice to apply the creosote by brushing or spraying it on the surface. Such treatment will tend to increase the life of the timber. But it is not recommended for general practice. A more effective treatment may be done by treating in a special pressure plant. A simpler method is known as the **hot and cold bath open tank process.** The timber is immersed in creosote which is heated for a period of 2 to 4 hours depending on the timber species and then transferred to another tank of cold creosote or simply allowed to cool in the same tank.

The treatment for timber which is to be used under cover is mainly directed against Powder Post Borers. This means that all susceptible sapwood from both hardwoods and brush timbers should be treated.

The treatment favoured at the present time in New South Wales is impregnation with boric acid. The timber should be green when the treatment is applied. It is immersed in a tank containing a weak solution of boric acid. The solution is maintained at approximately boiling point for the full period of treatment, which varies with the thickness of the timber and the species being treated. Alternatively, the initial heating period may be followed by a longer period of cooling or in special cases it is possible to treat the timber simply by immersing it in a cold bath of the boric acid.

There are many important details in connection with this treatment and it is recommended that advice be obtained from one of the State Forest Departments.

WEIGHT OF BUILDING MATERIALS.

Stone, &c.

Australian	Per cubic foot lbs.	Cubic feet per ton
Oamaru, Typo, Waurn Ponds and Geelong freestones	134	16½
Kyneton sandstone	138	16¼
Western Port do.	148	15
Spring Bay ditto ...	140	16
Pt. Ventenet do. ...	145	15½
Grampian sandstone	154	14½
Sydney sandstone ...	140	16
Bluestone (basalt) ...	161	14
Granite, grey or red	167	13½
Marble, Adelaide ...	169	13¼
Brickwork, dry, about	124	18
Sand (sharp), about	95	23½
Clay, mild earth ...	120	18½
Clay, strong and stiff	135	16½
Mortar, dry	93	24

Australian Facings.

In.		Ft. sup. p. ton
4	Sydney sandstone ...	48
3	Sawn bluestone ...	84
2½	thick Ditto	70
2	thick Ditto	56
1	Slate, Welch ...	160
1½	Ditto	107
1	Marble slabs, black ...	165
1	Ditto, white or veined	160

	Per cubic foot lbs.	Cubic feet per ton
Granite, Aberdeen ...	163	13¾
Marble, Carrara ...	170	13¼
Cast Iron	464	4·83
Mild Steel	477	4·70

Timber.

Imported	Per cubic foot lbs.	Cubic feet per ton
Red or White American pine (seasoned)	34	66
Yellow pine, Baltic (seasoned) ...	35	64
Red pine, Riga ditto	33	68
Pitch pine (seasoned)	39	57
Cedar, Spanish American (seasoned) ...	30	75
Mahogany, Spanish	66	34
Mahogany, Honduras, or Baywood ...	40	56
Oak, just felled ...	68	33
Oak, of commerce	57½	39
Oak, well seasoned...	48	47
Elm, just felled ...	58	38
Elm, well seasoned...	42	53
Teak, Indian, do. ...	42	53
Ebony	80	28
Australian.		
Cedar, N.S.W. ...	36	62
Kauri, New Zealand	40	56
Hardwood, about ...	56	40
Iron bark and box, just felled ...	70	32
Blue or red gum, ditto	65	34½
Stringy bark and Blackwood, do. ...	64	35
The 4 H.-woods average	60	37½
Jarrah	51	44
Maple, American ...	47	48
Maple, Queensland ...	48	47
Walnut, black ...	60	37
Walnut, Tasmanian	56	40

ROOFING, *per square.*	cwt.
Slates, 4in. lap ...	6
Shingles	2½ to 3
Zinc, plain, 8 to 12 gauge	⅝ to 1¼
Gal. Iron, 26 and 24 gauges, lapped 2 corrugations ...	1 to 1½

Lead—add 00 to the lbs. per foot for the lbs. per square (that is, multiply by 100) and allow for laps.

The rolls are generally 30ft. by 7ft. wide.

FLOORS, *per square.*	cwt.
1in. T. and G. American red or white pine	2
1⅛in. wrought Baltic red pine ...	2⅓
1in. ditto. pitch pine	2⅛
1in. Colonial Pine, T. & G.	2½
1in. Oregon, T. & G.	2½
⅞in. Oregon, T. & G.	2¼
1in. Hardwood, T. & G.	6
⅞in. Firsts, T. & G.	5

GLAZED LEAD LIGHT.

3 lbs. per sq. ft. average.

Sheet glass, per 16oz. to 21oz. and per foot Plate glass.

FLOORS SHOULD BE MADE TO SUPPORT PER SQ. FT.

	cwt.
Private or ordinary rooms, etc. from	1 to 2
Public Rooms for meetings, halls, theatres, etc., per square ft.	2½
Warehouses or stores, railway or wharf platforms, road bridges	3
Railway bridges or viaducts	5

METALS, *per cubic inch.*	lbs.
Iron bar	0·279
Iron or tin, cast ...	0·263
Steel, hard	0·283
Lead	0·411
Copper, cast ...	0·318
Brass, cast	0·304
Zinc, cast	0·26
Gun metal	0·31

LIME, CEMENT, &c.	lbs.
Lime, heads, p. bag, 3 bus.	180
Do. Geelong roche do.	200
Cement, Portland, p. cask of 3½ bushels	400
Plaster of Paris, p. ck. 3½ bushels ...	Net, 300

CEMENT AND CONCRETE AGGREGATES, *average per cubic ft.*	lbs.
Coke breeze	37
Clinker	80
Brick, broken ...	120
Sandstone, broken	140
Bluestone basalt ...	160

BRICKS, *per cubic foot.*	
Black or red ...	131
Sydney machine (commons)	101
Hand Made Sandstock (commons) ...	84

CONCRETE MATERIAL.	Per cubic foot lbs.	Cubic feet per ton
Cement, Portland	92	24
Cinders, clean ...	60	37
Coke, ordinary ...	46	49
Coke, breeze... ...	37	60½

Water, *rain or pure, at* 62 deg.
62½ lbs or 6¼ gallons, one cu. ft.
10 lbs., or 277¼ c. ins. one gallon.
35·85 c. ft., or 224 gallons, one ton.
8 gallons or 1 ft. 3½-12ths cube, one bushel.
1 bushel, 1·28 c. ft.
2 of 4 gallon kerosene tins, = ½ bushel each tin.

Weights in lbs. of one Cubic Foot.

Asphalte	155lbs.	Coke	40lbs.
Common Earth	95 to 125lbs.	Emery	250lbs.
Clay	135lbs.	Flint	164lbs.
Limestone	140lbs.	Glass (plate)	169lbs.
Coal (Solid)	80lbs.	Terra Cotta (Solid) ...	122lbs.
Coal (Loose)	52lbs.	Tar, Raw	11·7lbs.
Tar (Distilled) No. 1 ...	11·2lbs.	Tar (Distilled) No. 2 Per Gallon	11·4lbs.

Metals.

Milled Lead ...	... 711·5lbs.	Wrought Iron	480lbs.
Cast Lead	709lbs.	Tin	460lbs.
Copper	... 539·6lbs.	Cast Iron	450lbs.
Sheet Copper	548lbs.	Zinc	440lbs.
Drawn Copper	555lbs.	Bronze	512lbs.
Brass (Drawn)	524lbs.	Bell Metal	545lbs.
Steel	494lbs.		

THE NATURAL ANGLE OF REST FOR MATERIAL EXCAVATED.

Dry Sand, Sheltered	22 degrees	Clay	45 degrees
Wet Sand	38 ,,	Rubble or Mine Tips	45 ,,
Earth or Soil ...	30 ,,	River Shingle ...	40 ,,

BRICKS.—9in. x 4½in. x 3 in., average 8·4 lbs.
(Machine Commons), dry, 1000 = 8400lbs. = 75cwt.
1000 close stacked = 77 cubic feet.

APPROXIMATE WEIGHT OF TIMBER, Etc.

Per ton weight.

Hardwood ...	360ft. super	Cedar	700ft. super
Oregon	750ft. ,,	⅞ Baltic Flooring	1000ft. ,,
Kauri	750ft. ,,	¾ ,, Lining	1200ft. ,,
Redwood Dry ...	1000ft. ,,	½ ,, ,, ...	1600ft. ,,
5ft. Sawn H'dwood Palings,	400 count	Doors average	50 count
6ft. ,, ,, ,,	350 ,,	Stock Sashes, av.	100 pairs.
Hardwood Pickets	500 ,,	Bricks, ordinary	300 count.

N.S.W. BUILDING TRADES AWARDS

Owing to the present instability of the basic wage rate, and the rapid changes in award rates of pay this list of awards is not intended as a basis for payment of wages, but is given as a guide to the prices in this book. The prices in this book are based on these award rates and contractors can easily estimate by percentage any increase in award rates of pay. It will also assist interstate contractors, where the awards vary, in estimating their own costs.

FARES AND TRAVELLING ALLOWANCES.

Bricklayers, Plasterers, Carpenters, Joiners and Builders' Labourers are allowed :—2/– per day to 12 miles ; 2/6 per day for 12 to 20 miles ; 3/– per day 20 to 30 miles.

Cabinet Makers.—10 days annual leave ; 5 days sick leave ; All fares reasonably incurred.

Stonemason and stoneworker.—Payment for all Public Holidays. All fares reasonably incurred.

Other tradesmen. All fares reasonably incurred.

Rates of wages for the County of Yancowinna are 5/– extra on the basic wage rate for Sydney, Newcastle, Pt Kembla, Wollongong, or 1½d. per hour more.

N.S.W. STATE AWARD RATES—MAY, 1951.

BASIC WAGE RATE—£9 0s. 0d. FOR 40 HOUR WEEK.

The rates shown apply to Sydney, Newcastle, Port Kembla and Wollongong districts only.

TRADE.	Per Week £ s. d.	Per Hour s. d.
Asphalters	11 0 0	5 6
Bricklayers	12 6 0	6 1⅘
Builders' Labourers—		
Ordinary	11 7 6	5 8½
Skilled	11 17 6	5 11½
Cabinet Makers	10 14 0	5 3⅘
Carpenters	12 6 0	6 1⅘
Carpenters (bridge)	12 7 0	6 2 1/10
Carters (Timber)	9 13 0	1 ton
(5/– per ton extra above 1 ton truck)		
Carters (Brick)	9 16 0	1 ton
(5/– per ton extra above 1 ton truck)		
Crane Driver	12 2 6	6 0¾
Diver Carpenter (Harbour)	——	11 0 2/11
Diver Labourer	Per Day	56 5⅖
Diver's Attendant	Per Day	44 10
Drainer	11 10 6	5 9 3/10
Drainer (Licensed)	12 1 6	6 0 9/10
Electrician (Installation)	12 8 0	6 2⅘
Electrical Fitter	11 18 0	5 11 4/5
Electrical Mechanic	11 18 0	5 11 4/5
Gangers (to 12 Men)	11 18 0	5 11 4/5
,, (over 12 men)	12 2 0	6 0 2/5
Ganger in Charge	12 12 0	6 3⅕

TRADE.	Per Week £ s. d.	Per Hour s. d.
Glazier	11 4 0	5 $7\frac{1}{5}$
Lorry Drivers to 1 ton	10 8 0	5 $2\frac{2}{5}$
,, ,, to 2 ton	10 13 0	5 $3\frac{2}{10}$
,, ,, to 3 ton	10 18 0	5 $5\frac{2}{5}$
Painters (House)	11 18 0	5 $11\frac{2}{5}$
Painters (Ship)	12 3 0	6 $0\frac{9}{10}$
Painters (Grainers, Gilders and Writers) ...	12 11 4	6 $3\frac{2}{5}$
Paper Hangers	11 18 0	5 $11\frac{2}{5}$
Plasterers	12 6 0	6 $1\frac{4}{5}$
Plasterers (Fibrous)	12 7 8	6 $2\frac{3}{10}$
Plumber (Journeyman)	12 7 0	6 $2\frac{1}{10}$
Plumber (Licensed)	12 18 0	6 $5\frac{2}{5}$
Sign Writers	12 8 0	6 $2\frac{2}{5}$
Stone Masons	11 17 8	5 $11\frac{3}{10}$
,, ,, Assistant Machinist... ...	10 2 0	4 $11\frac{1}{10}$
,, ,, On Moulding	11 17 8	5 $11\frac{3}{10}$
,, ,, Other Work	11 2 6	5 $6\frac{3}{4}$
Stone Polishers	11 2 6	5 $6\frac{3}{4}$
Roof Tilers	12 6 0	6 $1\frac{4}{5}$
Slaters	12 6 0	6 $1\frac{4}{5}$
Tile Layers	12 8 0	6 $2\frac{2}{5}$
Watchman	10 3 0	5 $0\frac{9}{10}$
Watchman (Other Duties) ... ... Sat. and Sun. 10/- extra.	10 6 6	5 $1\frac{9}{20}$
Watchman (Casual)	——	5 $6\frac{9}{10}$
Caretakers	11 1 6	——

The country rates elsewhere in N.S.W. (except the county of Yancowinna) are 3/- less per week or $\frac{9}{10}$d. less per hour than those shown above.

FIRST AID TO THE INJURED

The following notes on First Aid have been contributed by the St. John Ambulance Association of St. John House, 21 Macquarie Place, Sydney, the recognised teachers of First Aid, and have been taken from the St. John Manual "First Aid to the Injured."

RECOMMENDED FIRST AID KIT.

Dressings: Bandages 1" and 2", broad bandage, cotton wool, lint, sling, gauze. Cut lint and gauze into 2" x 2" strips, sewing each in a clean rag; sterilise by baking in oven one hour.

Iodine (tincture); Castor Oil; Soda Bicarb; Condy's Crystals; Sal Volatile.

Workshops should comply with requirements laid down by Dept. of Labour and Industry

SHOCK.

All cases of accident or sudden illness result in a condition known as Shock which must be treated primarily.

Treatment: Lay patient on his back, loosen clothing about the neck, chest and waist and ensure a free circulation of air. Cover with coats and blankets to keep patient warm, but do not overheat. When able to swallow give strong tea or coffee with plenty of sugar, or milk as hot a can be drunk.

HAEMORRHAGE (Bleeding)—GENERAL RULES FOR TREATMENT.

Place patient in suitable position. Elevate the bleeding part except in the case of broken limb. Expose wound, removing only whatever clothing is necessary. Remove any visible and easily removed foreign bodies. All others are left severely alone. When bleeding has stopped keep the patient warm. Give plenty of fluids especially warm tea or water with sugar if available.

Scalp.—Apply small firm pad on wound. Secure by narrow bandage.

Neck.—Apply thumb of one hand on the artery pressing backwards against the spine, taking care to avoid wind-pipe.

Face.—Below the level of the eye. Apply direct pressure on the wound from the outside of the cheek against the jaw bone.

Armpit.—Place hard pad (billiard ball size) in armpit. Apply centre of narrow bandage on pad, cross bandage on shoulder, pull ends tight and tie under the opposite armpit.

Upper Arm.—Apply pressure with fingers on the artery by grasping the arm at its centre from behind and compress the artery against the bone.

Forearm.—Apply pressure by the thumb placed on either of the pulsating arteries (according to the side the wound occurs).

Palm of Hand.—When foreign body or broken bone is not present—apply dressing and firm pad, making the patient grasp it. Bandage hand.

Fingers.—Apply small pad and secure firmly with bandage.

Thigh.—Place thumbs one on the other on the pulsating artery at the centre of the groin, grasping the thigh with hands. When wound occurs in upper region of artery keep the pressure up until the arrival of Doctor. Each fresh assistant places his thumbs over those of his predecessor, who slips his away, and thus gushes of blood are prevented during the change.

Leg.—Front or back. Apply pressure by fingers or pad if bleeding at the ankle, and bandage on pulsating arteries on front (below knee) and back (halfway down leg) of leg if haemorrhage occurs there.

Sole of Foot.—Apply dressing and firm pad and bandage to maintain firm pressure. Support foot in elevated position.

ANTISEPTICS.

In wounds and on the skin, no antiseptics which burn or irritate should be used. When prepared antiseptics are not available, use normal saline solution (one teaspoonful of common salt to one pint of sterile water). If sterilised dressings are not available, sterilise the fingers, cut piece of clean gauze, lint or boracic lint and apply to wound. Cover dressing with cotton wool and keep in place with bandage.

COLD COMPRESS.

Used to ease pain, lessen swelling, control internal bleeding. Soak a clean handkerchief or piece of lint in cold water and apply. Change frequently.

HOT COMPRESS.

Used to ease pain. Piece of flannel or lint soaked in very hot water and wrung dry and shaken to expel steam and applied to affected part.

FRACTURES (Broken Bones)—Signs and Symptoms.

Pain at or near fracture; loss of power in the limb; swelling about seat of fracture; deformity of limb; unnatural mobility.

Treatment: Attend to fracture on spot. No attempt must be made to move patient until limb has been rendered immovable as practicable by splints or other means of restraint. Steady and support injured limb, placing it in as natural position as possible. Apply splints and bandages.

SPLINTS.

May be improvised from walking sticks, umbrellas, broom handles, rifles, folded coats, piece of wood, etc. When splints are not available, tie fractured limb to the body and in all cases bandage a fractured lower limb to its fellow.

Fractured Skull.—Apply ice or cold water to head continuously keeping the patient absolutely quiet in a darkened room. Promote warmth to lower part of the body by applying hot water bottles to the sides of the abdomen and lower limbs.

Lower Jaw.—Place palm of hand below injured bone and press it gently against the upper jaw, applying bandage under the chin, carrying both ends upwards and tying above the head.

Collar Bone.—Place pad about 2″ thick in armpit. Place arm in sling; secure injured limb firmly to the side by broad bandage round elbow and trunk.

Ribs.—Apply 2 broad bandages or strong towel folded about 8″ wide firmly round the chest securing with 3 or 4 safety pins on side opposite the injury.

Forearm.—Apply splints on the front and back of forearm from elbow to fingers, unless there is a wound at the side of injury. Bandage above fracture and around the wrist. Place arm in sling.

Upper Arm (near Shoulder).—Apply broad bandage with upper border level with top of shoulder; pass it around the limb and body and tie on opposite side under armpit. **(Middle of Shaft).**—Apply splints from shoulder to elbow in front and back and outer side of arm. Secure splints by bandages above and below fracture.

Hand.—Apply carefully padded splint to front of hand and secure with bandage.

Thigh.—Apply bandage around ankles and feet; place splint along injured side from armpit to beyond the foot; secure with bandages.

Leg.—Apply splints on outer and inner side of leg and secure by bandages. When no splints are available tie feet, ankles, knees and thighs together.

Crushed Foot.—Apply carefully padded splint to sole of foot from heel to toes and secure with bandages.

DISLOCATION OF JOINTS.

Steady and support limb in most comfortable position. Apply cold compresses to relieve pain. Do not attempt to reduce dislocation.

SPRAINS.

Apply firm bandage; keep the bandage wet with cold water.

STRAINS.

Support the injured part and apply hot compress.

RUPTURE (HERNIA).

Lay patient down, raise and support head and shoulders; bend the knees and place pillow under them. Apply ice or cold compress to affected part. Make no attempt to reduce swelling.

BURNS AND SCALDS.

Do not remove clothes and do not break any blisters. Saturate area with warm alkaline solution (1 dessertspoonful baking soda to 1 pint warm water) or warm saline solution (1 teaspoonful common salt to 1 pint warm water). Cover area with lint, gauze or linen soaked in similar solution. Bandage firmly in position. Give large quantities of warm weak sweet tea.

FOREIGN BODY IN EYEBALL.

Do not attempt to remove. Drop medicinal paraffin or castor oil on eyeball after pulling down lower lid. Close the lids, apply soft pad of cotton wool and secure by bandage.

QUICK LIME OR OTHER CORROSIVE ALKALI IN EYE.

Bathe the eye with vinegar and cold water (1 part in 4) and treat as for foreign body. If vinegar is not available, wash freely with cold water.

CORROSIVE ACID IN THE EYE.

Bathe the eye with solution of baking soda (1 dessertspoonful in pint of cold water) and treat as for foreign body.

FOREIGN BODY IN EAR CHANNEL.

Fill ear with Olive Oil when insect will float and may be removed. Do not probe or syringe the ear.

FOREIGN BODY IN NOSE.

Instruct patient to breathe through the mouth. Seek medical aid at once.

SUNSTROKE.

Sponge body with cold water continuously. Apply ice bags to head and spine; fan vigorously. Give epsom or glauber salts (1 tablespoon to tumbler of water). Place patient in cool spot.

APOPLEXY (STROKE).

Apply ice or cold water to head continuously; apply hot water bottle to lower limbs and feet. If face flushed raise head, loosen clothing.

FAINTING.

Sprinkle face with hot and cold water alternatively; apply warmth to pit of stomach and over the heart. Loosen all clothing, give air.

BITES.

Snake Bite, Spider Bite.—Immediately arrest circulation in limb by means of constriction on limb between the wound and the heart on the upper arm or thigh (as the case may be). Release constriction after 20 minutes immediately replacing it. Give hot drinks such as strong coffee, tea or milk. Encourage bleeding by scarifying puncture marks. Wash wound, preferably with weak (pale pink) solution of permanganate of potash (condy's crystals).

POISONS EMETICS—to make patient vomit.

1. **Mustard powder.**—1 tablespoonful in tumblerful (½ pint) of lukewarm water or
2. **Salt.**—Two tablespoonfuls in tumblerful (½ pint) of lukewarm water.

Except when lips and mouth are burned, promptly give an EMETIC. When lips and mouth are burned **do not** give an Emetic but give the following antidotes:

If an Acid is known to be the poison, give one of the following Alkalies: Lime-Water in large quantities or 1 tablespoonful of whitening, chalk or magnesia in ½ pint of, water repeated frequently, or earb. soda.

If an Alkali is known to be the poison, give one of the following Acids: Vinegar or lemon-juice or lime-juice, each diluted with an equal quantity of water, by the tumblerful.

If these antidotes are not readily available, or if it is not known whether the corrosive poison is an Acid or Alkali, give copious draughts of cold water or of milk.

Carbolic Acid (Phenol) and Lysol Poisons.—Give ½ pint of medicinal paraffin or Epsom or Glauber Salts, 1 tablespoonful in tumbler of milk or water.

Iodine Poison.—Before the emetic give starch and water freely or thin cornflour or arrowroot.

Phosphorus.—Give Epsom or Glauber Salts, 1 tablespoonful in tumblerful of water. Oil or fat in any form **must not be given.**

Alcohol.—Promote warmth of the body, ensure rest and shelter; adopt general rules which apply; give hot strong coffee.

Strychnine (Contained in many vermin killers).—Between the convulsions give an emetic and perform artificial respiration. Adopt the general rules which apply.

Prussic Acid and Cyanide Potassium.—Not a moment should be lost in carrying out treatment. Apply artificial respiration, even if breathing has not ceased. If patient can swallow, give freely brandy, whisky or sal volatile diluted with an equal quantity of water. Dash cold water on head and spine continuously. Adopt the general rules which apply.

ARTIFICIAL RESPIRATION FOR MILD ASPHYXIATION, ELECTRIC SHOCK, DROWNING, Etc.—SHAFER'S METHOD.

At once place the patient face downwards with arms extended above the head and head turned to one side so as to keep the nose and mouth away from the ground. Do not waste time by loosening clothing; no pad is to be placed under the patient nor need the tongue be drawn out. Kneel at one side of patient facing his head and sitting on your heels. Place your hands on the small of the patient's back, their lower edges just clearing the top of the pelvis, the wrists nearly touching, the thumbs as near each other as possible without strain and the fingers passing over the loins on either side and pointing towards the ground. Bending your body from the knees and somewhat straightening the hip joints, swing slowly forward keeping your arms quite straight and rigid. Swing your body slowly backwards to its first position. Alternate these movements by a rhythmic swaying forwards and backwards of your body from the knee joints, twelve times a minute. Rhythm is—pressure 2 seconds and relaxation 3 seconds. When natural breathing begins, regulate the movements of artificial respiration to correspond with it and promote circulation by rubbing the limbs vigorously towards the heart and applying warmth.

Artificial respiration must be continued perseveringly until respiration is restored or until a doctor pronounces life to be extinct.

USEFUL TABLES

BRITISH WEIGHTS AND MEASURES.

Lineal Measure.

7.92	inches	=	1 link.			
12	inches	=	1 foot.			
3	feet	=	1 yard.			
6	feet	=	1 fathom.			
5½	yards	=	1 rod, pole, or perch.			
100	links	=	66 feet	=	1 chain.	
220	yards	=	40 poles	=	10 chains	= 1 furlong.
8	furlongs	=	80 chains	=	1,760 yards	= 5,280 feet = 1 mile.
6,080	feet	=	1 Admiralty knot.			

Square Measure.

144	square inches	=	1 square foot.
9	square feet	=	1 square yard.
30¼	square yards	=	1 square pole, rod, or perch.
40	square poles	=	1 rood.
4	roods	=	4,840 square yards = 1 acre.
640	acres	=	1 square mile.

Liquid Measure.

8.665	cubic inches ...	=	1 gill.
4	gills	=	1 pint.
2	pints	=	1 quart.
4	quarts	=	1 gallon.
1	gallon	=	277¼ cubic inches or 0.16 cubic foot.
1	,, ...	=	10 lbs. of distilled water.
1	cubic foot ...	=	6.232 gallons.
1	cwt. water ...	=	1.8 cubic foot.
1	bushel	=	1.28 ,,

Avoirdupois Weight.

27.344	grains	=	1 drachm.
16	drachms	=	437½ grains = 1 ounce.
16	ounces	=	7,000 grains = 1 pound.
14	pounds	=	1 stone.
28	pounds	=	1 quarter.
4	quarters	=	112 pounds = 1 hundredweight.
20	hundredweight ...	=	2,240 pounds = 1 ton.

Troy Weight.

24	grains	=	1 pennyweight.
20	pennyweights ...	=	480 grains = 1 troy ounce.
12	troy ounces	=	5,760 grains = 1 troy pound.

Measures and their Square Dimensions.

		in.		in.		in.
1 pint	=	4	x	4	x	$2\frac{1}{10}$
1 quart	=	4	x	4	x	$3\frac{9}{16}$
1 gallon	=	7	x	4	x	8½
10 gals.	=	14	x	15	x	11
5 bushels	=	24	x	28	x	16

		in.		in.		in.
31½ gals.—1 barrel	=	24	x	24	x	14.7
½-bushel	=	12	x	11.2	x	8
1 bushel	=	12	x	11.2	x	16

Metres and Feet.

1 metre	=	3ft.	3.3704in.	1 foot	= .304 metres

METRIC TO IMPERIAL.

Linear Measure.

1 millimetre = 0·03937 inch.

1 metre =
- 39·370113 inches.
- 3.280843 feet.
- 1·0936143 yards.

1 kilometre = 0·62137 mile.

Square Measure.

1 square centimetre = ·15500016 square inches.
1 square metre = 10·7639 square feet.
1 hectare (10,000 square metres) = 2·4711 acres.

Cubic Measure.

1 cubic centimetre = ·06103296 cubic inches.

1 cubic metre =
- 35·32 cubic feet.
- 1·31 cubic yards.

10 cubic metres are a fraction over 13 cubic yards.

Capacity. 1 litre =
- 1·75980 pints.
- 0·22 gallon.

Weight.
- 1 gramme = 15·432 grains.
- 1 kilogram =
  - 2·2046223 lb. (avoir.).
  - 15432·3564 grains.
- 1,000 kilograms (1 tonne) = 0·9842 ton.

IMPERIAL TO METRIC.

Linear Measure.
- 1 inch = 25·4 millimetres.
- 1 foot = 304·8 millimetres.
- 1 yard = 0·914399 metre.
- 1 mile = 1·6093 kilometres.

Square Measure.
- 1 square inch = 6·4516 square centimetres.
- 1 square yard = 0·836126 square metre.
- 1 acre = 0·40468 hectare.

Cubic Measure.
- 1 cubic inch = 16·38618 cubic centimetres.
- 1 cubic foot = 28·3153 cubic decimetres.
- 1 cubic yard = 0·7645 cubic metres.
- 13 cubic yards = 10 cubic metres (approx.).

Capacity.
- 1 pint = 0·568 litre.
- 1 gallon = 4·5459631 litres.

Weight (Avoirdupois).
- 1 grain = 0·0648 gramme.
- 1 ounce = 28·35 grammes.
- 1 pound = 0·45359243 kilogramme.
- 1 ton = 1,016 kilogrammes.

FRACTIONS AND THEIR DECIMAL EQUIVALENTS.

1/64	0·0156	17/64	0·2656	33/64	0·5136	49/64	0·7656
1/32	0·03125	9/32	0·28125	17/32	0·53125	25/32	0·78125
3/64	0·0468	19/64	0·2968	35/64	0·5468	51/64	0·7968
1/16	0·625	5/16	0·3125	9/16	0·5625	13/16	0·8125
5/64	0·0781	21/64	0·3281	37/64	0·5781	53/64	0·8281
3/32	0·09375	11/32	0·34375	19/32	0·59375	27/32	0·84375
7/64	0·1093	23/64	0·3593	39/64	0·6903	55/64	0·8593
1/8	0·125	3/8	0·375	5/8	0·625	7/8	0·875
9/64	0·1406	25/64	0·3906	41/64	0·6406	57/64	0·8906
5/32	0·15625	13/32	0·40625	21/32	0·65625	29/32	0·90625
11/64	0·1718	27/64	0·4218	43/64	0·6718	59/64	0·9218
3/16	0·1875	7/16	0·4375	11/16	0·6875	15/16	0·9375
13/64	0·2031	29/64	0·4531	45/64	0·7031	61/64	0·9531
7/32	0·21875	15/32	0·46875	23/32	0·71875	31/32	0·96875
15/64	0·2343	31/64	0·4843	47/64	0·7343	63/64	0·9843
1/4	0·25	1/2	0·5	3/4	0·75	1	1·0

APPROXIMATE METRIC EQUIVALENTS.

Useful for Rough Calculations.

1 millimetre	=	$\frac{1}{25}$ inch (0·03937).
1 inch	=	25 m/m. (25·4).
1 metre	=	3 ft. 3⅜ in. (3·281), or $1\frac{1}{11}$ yard (1·0936).
1 kilometre	=	⅝ mile (0·6214).
1 mile	=	$1\frac{3}{5}$ kilometre (1·61).
1 sq. inch	=	6½ sq. c/m. (6·45).
1 sq. yard	=	⅚ sq. metre (0·836).
1 sq. metre	=	10¾ sq. ft. (10·764).
1 acre	=	4,000 sq. metres (4,046).
1 cubic yard	=	¾ cubic metre (0·7646).
1 cubic metre	=	$1\frac{1}{3}$ cubic yards (1·31).
1 litre	=	$1\frac{3}{4}$ pints (1·76).
1 gallon	=	4½ litres (4·546).
1 gramme	=	15½ grains (15·43).
1 kilogramme	=	$2\frac{1}{5}$ pounds (2·205).
1 pound	=	$\frac{5}{11}$ kilogramme (0·4536).
1 ton	=	1,000 kilos. (1·016).

Closer approximations are given in brackets.

HINTS ON RECKONING.

Given the price per ton to find value of more or less weight.
Reckon the tons as pounds, cwts., as shillings, each quarter as 3d., and for every 9 lbs. as 1d.

INCHES CONVERTED TO MILLIMETRES.

In.	0	1/16	1/8	3/16	1/4	5/16	3/8	7/16
0	0·0	1·6	3·2	4·8	6·4	7·9	9·5	11·1
1	25·4	27·0	28·6	30·2	31·7	33·3	34·9	36·5
2	50·8	52·4	54·0	55·6	57·1	58·7	60·3	61·9
3	76·2	77·8	79·4	81·0	82·5	84·1	85·7	87·3
4	101·6	103·2	104·8	106·4	108·0	109·5	111·1	112·7
5	127·0	128·6	130·2	131·8	133·4	134·9	136·5	138·1
6	152·4	154·0	155·6	157·2	158·8	160·3	161·9	163·5
7	177·8	179·4	181·0	182·6	184·2	185·7	187·3	188·9
8	203·2	204·8	206·4	208·0	209·6	211·1	212·7	214·3
9	228·6	230·2	231·8	233·4	235·0	236·5	238·1	239·7
10	254·0	255·6	257·2	258·8	260·4	261·9	263·5	265·1
11	279·4	281·0	282·6	284·2	285·7	287·3	288·9	290·5
12	304·8	306·4	308·0	309·6	311·1	312·7	314·3	315·9
13	330·2	331·8	333·4	335·0	336·5	338·1	339·7	341·3
14	355·6	357·2	358·8	360·4	361·9	363·5	365·1	366·7
15	381·0	382·6	384·2	385·8	387·3	388·9	390·5	392·1
16	406·4	408·0	409·6	411·2	412·7	414·3	415·9	417·5
17	431·8	433·4	435·0	436·6	438·1	439·7	441·3	442·9
18	457·2	458·8	460·4	462·0	463·5	465·1	466·7	468·3
19	482·6	484·2	485·8	487·4	488·9	490·5	492·1	493·7
20	508·0	509·6	511·2	512·8	514·3	515·9	517·5	519·1

In.	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16
0	12·7	14·3	15·9	17·5	19·1	20·6	22·2	23·8
1	38·1	39·7	41·3	42·9	44·4	46·0	47·6	49·2
2	63·5	65·1	66·7	68·3	69·8	71·4	73·0	74·6
3	88·9	90·5	92·1	93·7	95·2	96·8	98·4	100·0
4	114·3	115·9	117·5	119·1	120·7	122·2	123·8	125·4
5	139·7	141·3	142·9	144·5	146·1	147·6	149·2	150·8
6	165·1	166·7	168·3	169·9	171·5	173·0	174·6	176·2
7	190·5	192·1	193·7	195·3	196·9	198·4	200·0	201·6
8	215·9	217·5	219·1	220·7	222·3	223·8	225·5	227·0
9	241·3	242·9	244·5	246·1	247·7	249·2	250·8	252·4
10	266·7	268·3	269·9	271·5	273·1	274·6	276·2	277·8
11	292·1	293·7	295·3	296·9	298·4	300·0	301·6	303·2
12	317·5	319·1	320·7	322·3	323·8	325·4	327·0	328·6
13	342·9	344·5	346·1	347·7	349·2	350·8	352·4	354·0
14	368·3	369·9	371·5	373·1	374·6	376·2	377·8	379·4
15	393·7	395·3	396·9	398·5	400·0	401·6	403·2	404·8
16	419·1	420·7	422·3	423·9	425·4	427·0	428·6	430·2
17	444·5	446·1	447·7	449·3	450·8	452·4	454·0	455·6
18	469·9	471·5	473·1	474·7	476·2	477·8	479·4	481·0
19	495·3	496·9	498·5	500·1	501·6	503·2	504·8	506·4
20	520·7	522·3	523·9	525·5	527·0	528·6	530·2	531·8

SHEET LEAD GAUGE.

Lbs. per sq. ft.	1	2	3	4	5	6	7
Thickness ... ... in.	·017	·034	·051	·068	·085	·101	·118

Lbs. per sq. ft.	8	9	10	11	12	14
Thickness ... ... in.	·135	·152	·169	·186	·203	·237

CONVERSION FACTORS.

To Convert	To	Multiply by	Log.
Inches	Centimetres ...	2·54	0·40483
Inches	Millimetres ...	25·4	1·40483
Feet	Metres	0·3048	$\bar{1}$·48401
Yards	Metres	0·9144	$\bar{1}$·96114
Sq. in.	Sq. cm.... ...	6·4516	0·80967
Sq. in.	Sq. mm. ...	645·16	2·80967
Sq. in.	Sq. mils. ...	1000000·0	6·00000
Sq. in.	Cir. mils. ...	1273240·00	6·10491
Sq. mils.	Cir. mils. ...	1·27324	0·10491
Cubic inches	Cubic centimetres	16·387	1·21450
Ounces (avoir.)	Grammes ...	28·35	1·45255
Pounds	Kilogrammes	0·4536	$\bar{1}$·65667
Millivolts	Volts	0·001	$\bar{3}$·00000
Microhms	Ohms	0·000001	$\bar{6}$·00000
Microhms per cm.^{3}	Mhms. per cub. in.	0·3937	$\bar{1}$·59517
Feet per lb. (wire or tape) ...	Metres per kilo.	0·67196	$\bar{1}$·82734
Lbs. per ft. (,, ,,) ...	Kilos. per metre	1·4882	0·17266
Ohms per ft. (,, ,,) ...	Ohms per metre	3·2809	0·51599
Ohms per lb. (,, ,,) ...	Ohms per kilo ...	0·4536	$\bar{1}$·65667
Deg. C.	Deg. F.... ...	(C° × 1·8) + 32	

To Convert	To	Multiply by	Log.
Centimetres	Inches ...	0·3937	$\bar{1}$·59517
Millimetres	Inches ...	0·03937	$\bar{2}$·59517
Metres	Feet	3·2809	0·51599
Metres	Yards ...	1·094	0·03902
Sq. cm.	Sq. in. ...	0·155	$\bar{1}$·19033
Sq. mm.	Sq. in. ...	0·00155	$\bar{3}$·19033
Sq. mils.	Sq. in. ...	0·000001	$\bar{6}$·00000
Cir. mils.	Sq. in. ...	0·0000007854	$\bar{7}$·89509
Cir. mils.	Sq. mils. ...	0·7854	$\bar{1}$·89509
Cubic centimetres	Cub. ins. ...	0·0610	$\bar{2}$·78533
Grammes	Ounces (avoir.)	0·035273	$\bar{2}$·54745
Kilogrammes	Pounds ...	2·2046	0·34333
Volts	Millivolts ...	1000·0	3·00000
Ohms	Microhms ...	1000000·0	6·00000
Microhms per cub. in.	Mhms. per cm.^{3}	2·54	0·40483
Metres per kilo. (wire or tape)	Feet per lb.	1·4882	0·17266
Kilos. per metre (,, ,,)	Lbs. per ft.	0·67196	$\bar{1}$·82734
Ohms per metre (,, ,,)	Ohms per ft.	0·3048	$\bar{1}$·48401
Ohms per kilo. (,, ,,)	Ohms per lb.	2·2046	0·34333
Deg. F.	Deg. C. ...	(F° — 32) ÷ 1·8	

SOLID MEASURE.

1,728 Cubic Inches equal 1 Cubic Foot
27 ,, Feet ,, 1 Cubic Yard
5 ,, Feet ,, 1 Barrel Bulk Shipping
40 ,, Feet ,, 1 Ton Shipping (Merchandise)
42 ,, Feet ,, 1 Ton Shipping (Timber)

MILLIMETRES CONVERTED TO INCHES.

M/M.	In.	M/M.	In.	M/M.	In.	M/M.	In.
1	·0394	26	1·0236	51	2·0079	76	2·9921
2	·0787	27	1·0630	52	2·0472	77	3·0315
3	·1181	28	1·1024	53	2·0866	78	3·0709
4	·1575	29	1·1417	54	2·1260	79	3·1102
5	·1968	30	1·1811	55	2·1653	80	3·1496
6	·2362	31	1·2205	56	2·2047	81	3·1890
7	·2756	32	1·2598	57	2·2441	82	3·2283
8	·3150	33	1·2992	58	2·2835	83	3·2677
9	·3543	34	1·3386	59	2·3228	84	3·3071
10	·3937	35	1·3779	60	2·3622	85	3·3464
11	·4331	36	1·4173	61	2·4016	86	3·3858
12	·4724	37	1·4567	62	2·4409	87	3·4252
13	·5118	38	1·4961	63	2·4803	88	3·4646
14	·5512	39	1·5354	64	2·5197	89	3·5039
15	·5905	40	1·5748	65	2·5590	90	3·5433
16	·6299	41	1·6142	66	2·5984	91	3·5827
17	·6693	42	1·6535	67	2·6378	92	3·6220
18	·7087	43	1·6929	68	2·6772	93	3·6614
19	·7480	44	1·7323	69	2·7165	94	3·7008
20	·7874	45	1·7716	70	2·7559	95	3·7401
21	·8268	46	1·8110	71	2·7953	96	3·7795
22	·8661	47	1·8504	72	2·8346	97	3·8189
23	·9055	48	1·8898	73	2·8740	98	3·8583
24	·9449	49	1·9291	74	2·9134	99	3·8976
25	·9842	50	1·9685	75	2·9527	100	3·9370

POUNDS INTO KILOGRAMS.

Pounds.	0	1	2	3	4	5	6	7	8	9
	Kilo-grams.	Kilo-grams.	Kilo-grams.	Kilo-grams.	Kilo-grams.	Kilo-grams.	Kilo-grams.	Kilo-grams.	Kilo-grams.	Kilo-grams.
0		0·454	0·907	1·361	1·814	2·268	2·722	3·175	3·629	4·082
10	4·536	4·990	5·443	5·897	6·350	6·804	7·257	7·711	8·165	8·618
20	9·072	9·525	9·979	10·433	10·886	11·340	11·793	12·247	12·701	13·154
30	13·608	14·061	14·515	14·969	15·422	15·876	16·329	16·783	17·237	17·690
40	18·144	18·597	19·051	19·504	19·958	20·412	20·865	21·319	21·772	22·226
50	22·680	23·133	23·587	24·040	24·494	24·948	25·401	25·855	26·308	26·762
60	27·216	27·669	28·123	28·576	29·030	29·484	29·937	30·391	30·844	31·298
70	31·751	32·205	32·659	33·112	33·566	34·019	34·473	34·927	35·380	35·834
80	36·287	36·741	37·195	37·648	38·102	38·555	39·009	39·463	39·916	40·370
90	40·823	41·277	41·730	42·184	42·638	43·091	43·545	43·998	44·453	44·906
100	45·359	45·813	46·266	46·720	47·174	47·627	48·081	48·534	48·988	49·442

KILOGRAMS INTO POUNDS.

Kilo-grams.	0	1	2	3	4	5	6	7	8	9
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
0		2·205	4·409	6·614	8·818	11·023	13·228	15·432	17·637	19·842
10	22·046	24·251	26·455	28·660	30·865	33·069	35·274	37·479	39·683	41·888
20	44·092	46·297	48·502	50·706	52·911	55·116	57·320	59·525	61·729	63·934
30	66·139	68·343	70·548	72·752	74·957	77·162	79·366	81·571	83·776	85·980
40	88·185	90·389	92·594	94·799	97·003	99·208	101·41	103·62	105·82	108·03
50	110·23	112·44	114·64	116·84	119·05	121·25	123·46	125·66	127·87	130·07
60	132·28	134·48	136·69	138·89	141·10	143·30	145·51	147·71	149·91	152·12
70	154·32	156·53	158·73	160·94	163·14	165·35	167·55	169·76	171·96	174·17
80	176·37	178·57	180·78	182·98	185·19	187·39	189·60	191·80	194·01	196·21
90	198·42	200·62	202·83	205·03	207·23	209·44	211·64	213·85	216·05	218·26
100	220·46	222·67	224·87	227·08	229·28	231·49	233·69	235·89	238·10	240·30

USEFUL CALCULATIONS TO CONVERT ITEMS.

To Convert—	*Multiply by*
Inches to centimetres	2·5400
Yards to metres	0·9144
Feet to metres	0·3048
Miles to kilometres	1·6093
Square inches to square centimetres	6·4516
Square feet to square metres	0·0929
Square miles to acres	640·0000
Cubic inches to cubic centimetres	16·387
Cubic feet to cubic metres	0·028316
Cubic yards to cubic metres	·764532
Pounds to kilogrammes	0·45359
Pounds per foot to kilogrammes per metre	1·4881
Pounds per square foot to kilogrammes per square metre	4·88
Feet head of water to pounds per sq. in.	0·432
Atmospheres to pounds per square inch	14·73
Miles per hour to metres per second	0·44703
Horse-power to foot-pounds per minute	33000
Horse-power to kilowatts	·746
Horse-power to gramme-metres per sec.	76040
Horse-power to force de cheval	1·014
Kilowatt hours to horse-power hours	1·34
Foot-pounds to joules (watt-seconds)	1·355
Foot-pounds to gramme calories	·324
Gramme calories to British Thermal Units	·00397
British Thermal Units to therms	10^{-5}

Water weighs 10 lb. per gallon, 62·3 lb. per cubic foot, 0·036 lb. per cubic inch.

Ice weighs 57 lbs. per cubic foot, 0·033 lb. per cubic inch.

CONTENTS IN GALLONS PER FOOT OF DEPTH.

Ft.	Ins.		Ft.	Ins.	
3	0 dia.	44 gallons	6	0 dia.	176 gallons
3	6 „	60 „	7	0 „	240 „
4	0 „	78 „	8	0 „	314 „
4	6 „	99 „	9	0 „	397 „
5	0 „	123 „	10	0 „	490 „

LENGTHS OF A FOOT IN DIFFERENT COUNTRIES.

	Eng. Ins.		Eng. Ins.		Eng. Ins.
Spain	11·03	Denmark & Norway	12·35	Portugal	12·96
Holland	11·14			Russia	13·75
Sweden	11·69	Germany	12·36	France,	
America	12·00	Austria	12·45	metre	39·37

LENGTHS OF A MILE IN DIFFERENT COUNTRIES.

	Eng. Yds.		Eng. Yds.		Eng. Yds.
Russian	1100	Irish	2240	Swedish & Danish	7233
Italian	1467	Polish	4400	Hungarian	8630
English	1760	Spanish	5028	Norwegian	12400
Scotch	1984	German	5826	French League	3666

METRIC WEIGHTS AND MEASURES.

Lineal Measures.

The unit for length is the Metre.

	Yds.	Ft.	In.		
10 Millimetres or	0	0	0·3937	equal 1	Centimetre
10 Centimetres or	0	0	3·9370	,, 1	Decimetre
10 Decimetres or	1	0	3·3708	,, 1	Metre
10 Metres or	10	2	9·7079	,, 1	Decametre
10 Decametres or	109	1	1·079	,, 1	Hectometre
10 Hectometres or	1093	1	10·79	,, 1	Kilometre

Weight.

The unit for weight is the Gramme.

	Lb.	Oz.	Drams.
10 Milligrammes or	0	0	0·0056438 equal 1 Centigramme
10 Centigrammes or	0	0	0·056438 equal 1 Decigramme
10 Decigrammes or	0	0	0·56438 equal 1 Gramme
10 Grammes or	0	0	5·6438 equal 1 Decagramme
10 Decagrammes or	0	3	6·438 equal 1 Hectogramme
10 Hectogrammes or	2	3	4·38 equal 1 Kilogramme

A Milligramme measures ·01543 of a Grain.

DECIMAL EQUIVALENTS OF SIXTY-FOURTHS.

$\frac{1}{64}$	$\frac{1}{32}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{5}{64}$	$\frac{3}{32}$	$\frac{7}{64}$
·015625	·03125	·046875	·0625	·078125	·09375	·109375

$\frac{1}{8}$	$\frac{9}{64}$	$\frac{5}{32}$	$\frac{11}{64}$	$\frac{3}{16}$	$\frac{13}{64}$	$\frac{7}{32}$
·125	·140625	·15625	·171875	·1875	·203125	·21875

$\frac{15}{64}$	$\frac{1}{4}$	$\frac{17}{64}$	$\frac{9}{32}$	$\frac{19}{64}$	$\frac{5}{16}$	$\frac{21}{64}$
·234375	·25	·265625	·28125	·296875	·3125	·328125

$\frac{11}{32}$	$\frac{23}{64}$	$\frac{3}{8}$	$\frac{25}{64}$	$\frac{13}{32}$	$\frac{27}{64}$	$\frac{7}{16}$
·34375	·359375	·375	·390625	·40625	·421875	·4375

$\frac{29}{64}$	$\frac{15}{32}$	$\frac{31}{64}$	$\frac{1}{2}$
·453125	·46875	·484375	·5

MENSURATION OF SURFACES AND VOLUMES.

Area of Rectangle = length × breadth.

Area of triangle = base × half perpendicular height.

When three sides given: From the half sum of the three sides subtract each side separately; multiply the half sum and the three remainders together. The area is the square root of the product thus obtained.

Parallelogram.—Area = base multiplied by height.

Trapezium (a figure with two sides parallel and two sides not parallel). —To find the area multiply the sum of the two parallel sides by the distance between them and divide by two.

Square or Rhombus (an oblique parallelogram with four equal sides). —Area equals half the product of the diagonals.

Irregular Polygon.—The area may be found by dividing it into a series of triangles and trapeziums and finding the sum of the areas thus obtained.

Regular Polygon.—Area equals number of sides multiplied by length of one side and by the radius of the inscribed circle divided by two.

Diameter of circle = radius × 2 = circumference × 0·31831.

To find diameter of circle having given area: Divide the area by ·7854 and extract the square root.

Circle.—Circumference equals diameter multiplied by 3·1416, or approximately by $3\frac{1}{7}$. Area equals diameter squared multiplied by ·7854.

Sector of Circle.—Multiply the length of the arc by the radius and divide by two.

Segment of Circle.—Find the area of sector having the same arc. Also find area of triangle formed by the radial sides and the chord. The area equals the sum or difference of these according as the segment is greater or less than a semi-circle.

Annulus.—Multiply the sum of the diameters by their difference and by ·7854.

Square equal to a Circle.—Side of square equals diameter multiplied by ·8862.

Inscribed Square.—Side of square equals diameter multiplied by ·7071.

Ellipse.—Area equals the product of the two axes by ·7854.

To find the volume of a cylinder: Multiply the area of the section in square inches by the length in inches = the volume in cubic inches. Cubic inches divided by 1728 = volume in cubic feet.

Surface of a sphere = square of diameter × 3·1416.

Volume of a sphere = cube of diameter × ·5236.

Side of an inscribed cube = radius of a sphere × 1·1547.

Area of the base of a pyramid or cone, whether round, square, or triangular, multiplied by one-third of its height = the volume.

To find area of a circle multiply square of diameter by ·7854.

To find diameter of a circle multiply circumference by ·31831.

To find circumference of a circle multiply diameter by 3·1416.

Area of surface of cylinder = circumference × length plus area of two ends.

SOLIDS.

Cube.—Surface equals length of one edge squared and multiplied by six. Contents equals length of one edge cubed.

Cylinders and Prisms.—Surface equals perimeter of one end multiplied by height, plus twice the area of one end. Contents equal area of base multiplied by height. This also applies to oblique cylinders and prisms.

Cone or Pyramid.—Surface equals circumference of base multiplied by slant height divided by two, plus the area of the base. Contents equals area of base multiplied by one-third perpendicular height. This applies whether the cones or pyramids are upright or oblique.

Frustrum of Cone or Pyramid.—Contents: To the sum of the area of the two ends add the square root of their product and multiply the quantity thus obtained by one-third the perpendicular height.

Sphere.—Area equals square of diameter multiplied by 3·1416 or $3\frac{1}{7}$—i.e., it is equal to four times the area of one of its great circles, or to the convex surface of its circumscribing cylinder. Surfaces of spheres vary as the squares of their diameter. Contents equals the cube of the diameter multiplied by ·5236—i.e., equals area of surface multiplied by diameter and divided by six. Contents of spheres vary as the cubes of the diameter.

Segment of Sphere.—Contents: From three times the diameter of the sphere subtract twice the height of the segment, multiply the difference by the square of the height and by ·5236; or, another rule: Add the square of the height to three times the square of the radius of the base and multiply the sum by the height and by ·5236.

Zone of Sphere.—To the sum of the squares of the radii of the two ends add one-third the square of the height, multiply the sum by the height and by 1·5708.

Cone, Sphere and Cylinder.—The contents of a cone, sphere and cylinder of same diameter and height are in the ratio of 1 to 2 to 3.

WEIGHT OF BODIES.

Weight of a body in grammes = Solid content in cub. cm. × specific gravity.

Weight of a body in lbs. = Solid content in cub. in. × specific gravity × ·036127.

Weight of a body in lbs. = Solid content in cub. ft. × specific gravity × 62·427.

One cubic inch of water weighs ·036127 lb.

One cubic foot of water weighs 62·427 lbs.

CONTENTS OF ONE ACRE-FOOT.

An acre-foot is the cubical content of one acre surface area one foot deep.

ONE ACRE-FOOT CONTAINS

43,560 cubic feet or 1613⅓ cubic yards.
271,466 gallons of water weighing 1212 tons approx.

REMOVING RUST FROM IRON.

May easily be effected by immersing the article in a nearly saturated solution of chloride of tin, even if much eaten into. The duration of the immersion will depend upon the thicker or thinner film of rust; in most cases, however, 12 to 24 hours will suffice. The solution of chloride of tin must not contain too great an excess of acid, otherwise it will attack the iron itself. After the articles have been removed from the bath, they should first be washed in water, and then with ammonia, and be dried as quickly as possible. Articles treated in this manner assume the appearance of dead silver.

Prevent Lead from spluttering in leading iron pallisading into stone.—Drop oil into hole or mould.

To test Iron or Steel.—A drop of nitric acid turns iron white and steel black.

Flux for Soldering Zinc.—Dissolve small pieces of zinc in muriatic acid, with water, double quantity.

USEFUL MEMORANDA.

To toughen Plaster Casts and prevent cracking, saturate them in hot glue and water—1 to 5.

Never use Tarred Paper under a tin roof. The acid in the tar destroys the metal.

Place thick paper under tin to prevent damage when laid on concrete.

To hang a door that will rise as it opens and also shut itself unaided, use a wider butt hinge at bottom than top of door.

To **Underpin Super-structure of Building** for Insertion of Rolled Steel Joists or Girders.—Above the proposed girder position make holes through wall at most solid portions, such as between windows or openings above, sufficient only to insert cross girders, of steel preferred. Support these each on timber or steel uprights, leaving sufficient room for insertion and working of proposed girders between the rows of uprights. Raise uprights to required height by "fox-tail" wedges inserted at bottom, and staying uprights if necessary. When the weight is taken, carefully remove the building material, of stone or brick.

Place your bearer in position with ends secured, then, build in with cement and iron wedges driven above girder till the whole length is solidly resting on girder, and properly set and dry; then remove under-pinning timbers and cross girders, the holes being built up solid.

CIRCUMFERENCES AND AREAS OF CIRCLES,

for either inches, feet, yards, links or chains.

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
			9	28·27	63·62	18	56·55	254·47
¼	0·785	·049	¼	29·06	67·20	¼	57·33	261·52
½	1·571	·196	½	29·84	70·88	½	58·12	268·80
¾	2·356	·442	¾	30·63	74·66	¾	58·91	276·12
1	3·142	·785	10	31·42	78·54	19	59·69	283·53
¼	3·927	1·227	¼	32·20	82·52	¼	60·47	291·04
½	4·712	1·767	½	32·99	86·59	½	61·26	298·65
¾	5·498	2·405	¾	33·77	90·76	¾	62·05	306·35
2	6·283	3·142	11	34·56	95·03	20	62·83	314·16
¼	7·069	3·976	¼	35·34	99·40	¼	63·62	322·06
½	7·854	4·909	½	36·13	103·87	½	64·40	330·06
¾	8·639	5·939	¾	36·91	108·43	¾	65·19	338·16
3	9·425	7·068	12	37·70	113·10	21	65·79	346·36
¼	10·210	8·296	¼	38·47	117·86	¼	66·76	354·66
½	10·995	9·621	½	39·27	122·72	½	67·54	363·05
¾	11·781	11·044	¾	40·05	127·68	¾	68·33	371·54
4	12·566	12·566	13	40·84	132·73	22	69·11	380·13
¼	13·351	14·186	¼	41·63	137·89	¼	69·90	388·82
½	14·137	15·904	½	42·41	143·14	½	70·69	397·61
¾	14·922	17·720	¾	43·20	148·49	¾	71·47	406·49
5	15·71	19·63	14	43·98	153·94	23	72·26	415·48
¼	16·49	21·65	¼	44·77	159·48	¼	73·04	424·56
½	17·28	23·76	½	45·55	165·13	½	73·83	433·73
¾	18·06	25·97	¾	46·34	170·87	¾	74·61	443·01
6	18·85	28·27	15	47·12	176·71	24	75·40	452·39
¼	19·63	30·68	¼	47·91	182·65	¼	76·18	461·86
½	20·42	33·18	½	48·69	188·69	½	76·97	471·44
¾	21·20	35·78	¾	49·48	194·83	¾	77·75	481·11
7	21·99	38·48	16	50·26	201·06	25	78·54	490·87
¼	22·78	41·28	¼	51·05	207·39	¼	79·32	500·74
½	23·56	44·18	½	51·84	213·82	½	80·11	510·71
¾	24·35	47·17	¾	52·62	220·35	¾	80·90	520·77
8	25·13	50·26	17	53·41	226·98	26	81·68	530·93
¼	25·92	53·46	¼	54·19	233·70	¼	82·47	541·19
½	26·70	56·74	½	54·98	240·53	½	83·25	551·55
¾	27·49	60·13	¾	55·76	247·45	¾	84·04	562·00

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES.

for either inches, feet, yards, links, or chains.

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
27	84·82	572·56	36	113·10	1017·9	45	141·37	1590·4
¼	85·61	583·21	¼	113·88	1032·1	¼	142·16	1608·2
½	86·39	593·96	½	114·67	1046·4	½	142·94	1626·0
¾	87·18	604·81	¾	115·45	1060·7	¾	143·73	1643·9
28	87·96	615·75	37	116·24	1075·2	46	144·51	1661·9
¼	88·75	626·80	¼	117·02	1089·8	¼	145·30	1680·0
½	89·53	637·94	½	117·81	1104·5	½	146·08	1698·2
¾	90·32	649·18	¾	118·59	1119·2	¾	146·87	1716·5
29	91·11	660·52	38	119·38	1134·1	47	147·66	1734·9
¼	91·89	671·96	¼	120·17	1149·1	¼	148·44	1753·5
½	92·68	683·49	½	120·95	1164·1	½	149·23	1772·1
¾	93·46	695·13	¾	121·74	1179·3	¾	150·01	1790·8
30	94·25	706·86	39	122·52	1194·6	48	150·80	1809·6
¼	95·03	718·69	¼	123·31	1209·9	¼	151·58	1828·5
½	95·82	730·62	½	124·09	1225·4	½	152·36	1847·5
¾	96·60	742·64	¾	124·88	1241·0	¾	153·15	1868·6
31	97·39	754·77	40	125·66	1256·6	49	153·94	1885·7
¼	98·17	766·99	¼	126·45	1272·4	¼	154·72	1905·0
½	98·97	779·31	½	127·23	1288·2	½	155·51	1924·4
¾	99·75	791·73	¾	128·02	1304·2	¾	156·29	1943·9
32	100·53	804·25	41	128·81	1320·3	50	157·08	1963·5
¼	101·32	816·86	¼	129·59	1336·4	¼	157·87	1983·2
½	102·10	829·58	½	130·38	1352·6	½	158·65	2003·0
¾	102·89	842·39	¾	131·16	1369·0	¾	159·44	2022·8
33	103·67	855·30	42	131·95	1385·4	51	160·22	2042·8
¼	104·46	868·30	¼	132·73	1402·0	¼	161·01	2062·9
½	105·24	881·41	½	133·52	1418·6	½	161·79	2083·1
¾	106·03	894·61	¾	134·30	1435·4	¾	162·58	2103·4
34	106·81	907·92	43	135·09	1452·2	52	163·36	2123·7
¼	107·60	921·32	¼	135·87	1469·1	¼	164·15	2144·2
½	108·38	934·82	½	136·66	1486·2	½	164·93	2164·8
¾	109·17	948·41	¾	137·45	1503·3	¾	165·72	2185·4
35	109·96	962·11	44	138·23	1520·5	53	166·50	2206·2
¼	110·74	975·90	¼	139·02	1537·8	¼	167·29	2227·1
½	111·53	989·80	½	139·80	1555·3	½	168·08	2248·0
¾	112·31	1003·7	¾	140·59	1572·8	¾	168·86	2269·1

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES,

for either inches, feet, yards, links or chains.

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
54	169·65	2290·2	63	197·92	3117·3	72	226·20	4071·5
¼	170·43	2311·5	¼	198·71	3142·0	¼	226·98	4099·8
½	171·22	2332·8	½	199·49	3166·9	½	227·77	4128·3
¾	172·00	2354·3	¾	200·28	3191·9	¾	228·55	4156·8
55	172·70	2375·8	64	201·06	3217·0	73	229·34	4185·4
¼	173·57	2397·5	¼	201·85	3242·2	¼	230·12	4214·1
½	174·36	2419·2	½	202·63	3267·5	½	230·91	4242·9
¾	175·14	2441·1	¾	203·42	3292·8	¾	231·69	4271·8
56	175·93	2463·0	65	204·20	3318·3	74	232·48	4300·9
¼	176·72	2485·1	¼	204·99	3343·9	¼	233·26	4330·0
½	177·50	2507·2	½	205·77	3369·6	½	234·05	4359·2
¾	178·29	2529·4	¾	206·56	3395·3	¾	234·83	4388·5
57	179·07	2551·8	66	207·35	3421·2	75	235·62	4417·9
¼	179·86	2574·2	¼	208·13	3447·2	¼	236·41	4447·4
½	180·64	2596·7	½	208·92	3473·2	½	237·19	4477·0
¾	181·43	2619·4	¾	209·70	3499·3	¾	237·98	4506·7
58	182·21	2642·1	67	210·49	3525·7	76	238·76	4536·5
¼	183·00	2664·9	¼	211·27	3552·0	¼	239·55	4566·4
½	183·78	2687·8	½	212·06	3578·5	½	240·33	4596·4
¾	184·57	2710·9	¾	212·84	3605·0	¾	241·12	4626·4
59	185·35	2734·0	68	213·63	3631·7	77	241·90	4656·6
¼	186·14	2757·2	¼	214·41	3658·4	¼	242·69	4686·9
½	186·93	2780·5	½	215·20	3685·3	½	243·47	4717·3
¾	187·71	2803·9	¾	215·99	3712·2	¾	244·26	4747·8
60	188·50	2827·4	69	216·77	3739·3	78	245·04	4778·4
¼	189·28	2851·1	¼	217·56	3766·4	¼	245·83	4809·1
½	190·06	2874·8	½	218·34	3793·7	½	246·62	4839·8
¾	190·85	2898·6	¾	219·13	3821·0	¾	247·40	4870·7
61	191·64	2922·5	70	219·91	3848·5	79	248·19	4901·7
¼	192·42	2946·5	¼	220·70	3876·0	¼	248·97	4932·8
½	193·21	2970·6	½	221·48	3903·6	½	249·76	4963·9
¾	193·99	2994·8	¾	222·27	3931·4	¾	250·54	4995·2
62	194·78	3019·1	71	223·05	3959·2	80	251·33	5026·6
¼	195·56	3043·5	¼	223·84	3987·1	¼	252·11	5058·1
½	196·35	3068·0	½	224·62	4015·2	½	252·90	5089·6
¾	197·14	3092·6	¾	225·41	4043·3	¾	253·67	5121·2

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES, *for either inches, feet, yards, links, or chains.*

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
81	254·47	5153·0	87	273·32	5944·7	93	292·17	6792·9
½	256·04	5216·8	½	274·89	6013·2	½	293·74	6866·2
82	257·61	5281·0	88	276·46	6082·1	94	295·31	6939·8
½	259·18	5345·6	½	278·03	6151·4	½	296·88	7013·8
83	260·75	5410·6	89	279·60	6221·2	95	298·45	7088·2
½	262·32	5476·0	½	281·17	6291·3	½	300·02	7163·0
84	263·89	5541·8	90	282·74	6361·7	96	301·59	7238·2
½	265·47	5608·0	½	284·31	6432·6	½	303·16	7313·9
85	267·04	5674·5	91	285·89	6503·9	97	304·73	7389·8
½	268·61	5741·5	½	287·46	6575·6	98	307·84	7542·9
86	270·18	5808·8	92	289·03	6647·6	99	311·00	7697·7
½	271·75	5876·6	½	290·60	6720·1	100	314·16	7854·0

CIRCUMFERENCES.—If the diam. is between 100 and 200, call the radius the diam. and double the given circumference. If between 200 and 300, enter the Table with one-third the diam., and multiply the given circumference by 3. If between 300 and 400, or 400 and 500, enter the Table with one-fourth or one-fifth, and multiply by 4 or 5, and so on for any number, taking care to multiply the given circumference by the same figure that you divided the diam. by.

EXAMPLE.—Required the circumference of a circle whose diam. is 152.—Enter the Table with the radius 76, the circumference given is 238·76 and 238·76 × 2 = 477·52, the circumference required.

AREAS.—If the diam. is more than 100 enter the Table with one-half or one-third, &c., as above, and multiply the area given by (4 or 9, &c.), the *square* of the figure you divided the diam. by.

EXAMPLE.—Required the area of the circle given in the last example. Opposite to 76 the area given is 4536·5 and 4536·5 × 4 [2 × 2] = 18146·0, the area required.

CAPACITY.—The given or ascertained areas in inches, multiplied by 0·0433, or the areas in feet multiplied by 6·23, will give the number of gallons equal to the area, by one foot in depth.

EXAMPLE.—Required the contents per lineal foot of a 15 in. pipe. The area given is 176·71 and 176·71 × ·0433 = 7·65 gallons. The contents per foot in depth of a tank 12 ft. diam. will be — 113·10 × 6·23 = 704·6 gallons.

SQUARES OF NUMBERS ADVANCING BY $\frac{1}{8}$ths.

M. S. Stanley, A.M.I.E.A.

No.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0		·0156	·0625	·1406	·2500	·3906	·5625	·7656
1	1	1·2656	1·5625	1·8906	2·2500	2·6406	3·0625	3·5156
2	4	4·5156	5·0625	5·6406	6·2500	6·8906	7·5625	8·2656
3	9	9·7656	10·5625	11·3906	12·2500	13·1406	14·0625	15·0156
4	16	17·0156	18·0625	19·1406	20·2500	21·3906	22·5625	23·7656
5	25	26·2656	27·5625	28·8906	30·2500	31·6406	33·0625	34·5156
6	36	37·5156	39·0625	40·6406	42·2500	43·8906	45·5625	47·2656
7	49	50·7656	52·5625	54·3906	56·2500	58·1406	60·0625	62·0156
8	64	66·0156	68·0625	70·1406	72·2500	74·3906	76·5625	78·7656
9	81	83·2656	85·5625	87·8906	90·2500	92·6406	95·0625	97·5156
10	100	102·5156	105·0625	107·6406	110·2500	112·8906	115·5625	118·2656
11	121	123·6756	126·5625	129·3906	132·2500	135·1406	138·0625	141·0156
12	144	147·0156	150·0625	153·1406	156·2500	159·3906	162·5625	165·7656
13	169	172·2656	175·5625	178·8906	182·2500	185·6406	189·0625	192·5156
14	196	199·5156	203·0625	206·6406	210·2500	213·8906	217·5625	221·2656
15	225	228·7656	232·5625	236·3906	240·2500	244·1406	248·0625	252·0156
16	256	260·0156	264·0625	268·1406	272·2500	276·3906	280·5625	284·7656
17	289	293·2656	297·5625	301·8906	306·2500	310·6406	315·0625	319·5156
18	324	328·5156	333·0625	337·6406	342·2500	346·8906	351·5625	356·2656
19	361	365·7656	370·5625	375·3906	380·2500	385·1406	390·0625	395·0156
20	400	405·0156	410·0625	415·1406	420·2500	425·3906	430·5625	435·7656

The above table is read vertically and horizontally.
Thus, the square of $5\frac{1}{2}$ = 30·25, or the square of $18\frac{7}{8}$ = 356·2656.

CUBES OF NUMBERS ADVANCING BY $\frac{1}{8}$ths.

No.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0		·002	·016	·053	·125	·244	·422	·670
1	1	1·424	1·953	2·600	3·375	4·291	5·359	6·592
2	8	9·596	11·391	13·396	15·625	18·088	20·797	23·764
3	27	30·518	34·328	38·443	42·875	47·635	53·734	58·186
4	64	70·189	76·766	83·740	91·125	98·932	107·172	115·857
5	125	134·611	144·703	155·287	166·375	177·979	190·109	202·779
6	216	229·783	244·141	259·084	274·065	290·775	307·547	324·951
7	343	361·705	381·078	401·131	421·875	443·322	465·484	488·373
8	512	536·377	561·516	587·428	614·125	641·619	669·922	699·045
9	729	759·799	791·453	823·975	857·375	891·666	926·859	962·967
10	1000	1037·971	1076·891	1116·771	1156·625	1199·463	1242·297	1286·139
11	1331	1376·893	1423·828	1471·818	1520·875	1571·010	1622·234	1674·561
12	1728	1782·564	1838·266	1895·115	1953·125	2012·307	2072·672	2134·232
13	2197	2260·986	2326·203	2392·662	2460·375	2529·354	2599·609	2671·154
14	2744	2818·158	2893·641	2970·459	3048·625	3128·150	3209·047	3291·326
15	3375	3460·080	3546·578	3634·506	3723·875	3814·697	3906·984	4000·748
16	4096	4192·752	4291·016	4390·803	4492·125	4594·994	4699·422	4805·420
17	4913	5022·174	5132·953	5245·350	5359·375	5475·041	5592·359	5711·342
18	5832	5954·346	6078·391	6204·146	6331·625	6460·838	6591·797	6724·514
19	6859	6995·268	7133·328	7273·193	7414·875	7558·385	7703·734	7850·936
20	8000	8150·939	8303·766	8458·490	8615·125	8773·682	8934·172	9096·607

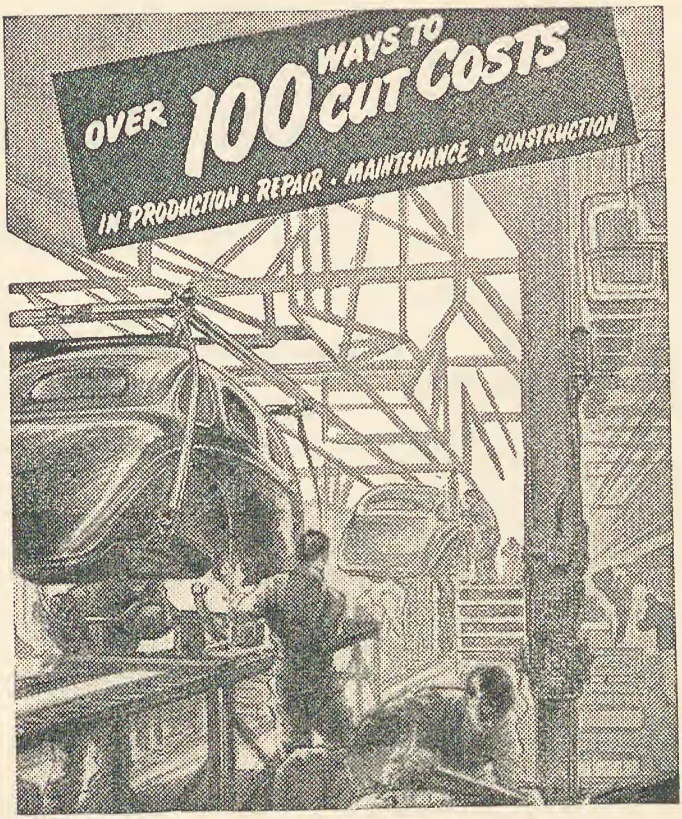
The above table gives the cube of any number between $\frac{1}{8}$ and $20\frac{7}{8}$; that is to say, the cube of 10 is 1000, or the cube of $10\frac{5}{8}$ is 1199·463.

INCHES AND FRACTIONS AS DECIMALS OF ONE FOOT.

	—	$\frac{1}{8}$ in.	$\frac{1}{4}$ in.	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.	$\frac{3}{4}$ in.	$\frac{7}{8}$ in.
—	—	·010	·020	·031	·041	·052	·062	·072
1 in.	·083	·093	·104	·114	·125	·135	·145	·156
2 in.	·166	·177	·187	·197	·208	·218	·229	·239
3 in.	·250	·260	·270	·281	·291	·302	·312	·322
4 in.	·333	·343	·354	·364	·375	·385	·395	·406
5 in.	·416	·427	·437	·447	·458	·468	·479	·489
6 in.	·5	·510	·520	·531	·541	·552	·562	·572
7 in.	·583	·593	·604	·614	·625	·635	·645	·656
8 in.	·666	·677	·687	·697	·708	·718	·729	·739
9 in.	·75	·760	·770	·781	·791	·802	·812	·822
10 in.	·833	·843	·854	·864	·875	·885	·895	·906
11 in.	·916	·927	·937	·947	·958	·968	·979	·989

THE HANDY READY RECKONER.

No.	1¼d.	1½d.	1¾d.	2d.	2¼d.	2½d.	2¾d.	3d.	3¼d.	3½d.	3¾d.	4d.	4¼d.	4½d.	4¾d.	5d.	5¼d.	5½d.	5¾d.
Art.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1	0 1¼	0 1½	0 1¾	0 2	0 2¼	0 2½	0 2¾	0 3	0 3¼	0 3½	0 3¾	0 4	0 4¼	0 4½	0 4¾	0 5	0 5¼	0 5½	0 5¾
2	0 2½	0 3	0 3½	0 4	0 4½	0 5	0 5½	0 6	0 6½	0 7	0 7½	0 8	0 8½	0 9	0 9½	0 10	0 10½	0 11	0 11½
3	0 3¾	0 4½	0 5¼	0 6	0 6¾	0 7½	0 8¼	0 9	0 9¾	0 10½	0 11¼	1 0	1 0¾	1 1½	1 2¼	1 3	1 3¾	1 4½	1 5¼
4	0 5	0 6	0 7	0 8	0 9	0 10	0 11	1 0	1 1	1 2	1 3	1 4	1 5	1 6	1 7	1 8	1 9	1 10	1 11
5	0 6¼	0 7½	0 8¾	0 10	0 11¼	1 0½	1 1¾	1 3	1 4¼	1 5½	1 6¾	1 8	1 9¼	1 10½	1 11¾	2 1	2 2¼	2 3½	2 4¾
6	0 7½	0 9	0 10½	1 0	1 1½	1 3	1 4½	1 6	1 7½	1 9	1 10½	2 0	2 1½	2 3	2 4½	2 6	2 7½	2 9	2 10½
7	0 8¾	0 10½	1 0¼	1 2	1 3¾	1 5½	1 7½	1 9	1 10¾	2 0½	2 2¼	2 4	2 5¾	2 7½	2 9¼	2 11	3 0¾	3 2½	3 4¼
8	0 10	1 1	1 2	1 4	1 6	1 8	1 10	2 0	2 2	2 4	2 6	2 8	2 10	3 0	3 2	3 4	3 6	3 8	3 10
9	0 11¼	1 1½	1 3¼	1 6	1 8¼	1 10½	2 0¾	2 3	2 5¼	2 7½	2 9¾	3 0	3 2¼	3 4½	3 6¾	3 9	3 11¼	4 1½	4 3¾
10	1 0½	1 3	1 5½	1 8	1 10½	2 1	2 3½	2 6	2 8½	2 11	3 1½	3 4	3 6½	3 9	3 11½	4 2	4 4½	4 7	4 9½
11	1 1¾	1 4½	1 7¼	1 10	2 0¾	2 3½	2 6¼	2 9	2 11	3 2½	3 5¼	3 8	3 10¾	4 1½	4 4¼	4 7	4 9¾	5 0½	5 3¼
12	1 3	1 6	1 9	2 0	2 3	2 6	2 9	3 0	3 3	3 6	3 9	4 0	4 3	4 6	4 9	5 0	5 3	5 6	5 9
13	1 4½	1 7½	1 10¾	2 2	2 5¼	2 8½	2 11¾	3 3	3 6¼	3 9½	4 0¾	4 4	4 7¼	4 10½	5 1¾	5 5	5 8¼	5 11½	6 2¾
14	1 5½	1 9	2 0½	2 4	2 7½	2 11	3 2½	3 6	3 9½	4 1	4 4½	4 8	4 11½	5 3	5 6½	5 10	6 1½	6 5	6 8½
15	1 6¾	1 10½	2 2¼	2 6	2 9¾	3 1½	3 5¾	3 9	4 0¾	4 4½	4 8¼	5 0	5 3¾	5 7½	5 11¼	6 3	6 6¾	6 10½	7 2¼
16	1 8	2 0	2 4	2 8	3 0	3 4	3 8	4 0	4 4	4 8	5 0	5 4	5 8	6 0	6 4	6 8	7 0	7 4	7 8
17	1 9¼	2 1½	2 5¾	2 10	3 2¼	3 6½	3 10¾	4 3	4 7¼	4 11½	5 3¾	5 8	6 0¼	6 4½	6 8¾	7 1	7 5¼	7 9½	8 1¾
18	1 10½	2 3	2 7½	3 0	3 4½	3 9	4 1½	4 6	4 10½	5 3	5 7½	6 0	6 4½	6 9	7 1½	7 6	7 10½	8 3	8 7½
19	1 11¾	2 4½	2 9¾	3 2	3 6¾	3 11½	4 4¼	4 9	5 1¾	5 6½	5 11¼	6 4	6 8¾	7 1½	7 6¼	7 11	8 3¾	8 8½	9 1¼
20	2 1	2 6	2 11¾	3 4	3 9	4 2	4 7	5 0	5 5	5 10	6 3	6 8	7 1	7 6	7 11	8 4	8 9	9 2	9 7
21	2 2¼	2 7½	3 0½	3 6	3 11¼	4 4½	4 9¾	5 3	5 8¼	6 1½	6 6¾	7 0	7 5¼	7 10½	8 3¾	8 9	9 2¼	9 7½	10 0¾
22	2 3½	2 9	3 2¼	3 8	4 1½	4 7	5 0½	5 6	5 11½	6 5	6 10½	7 4	7 9½	8 3	8 8½	9 2	9 7½	10 1	10 6½
23	2 4¾	2 10½	3 4¼	3 10	4 3¾	4 9½	5 3½	5 9	6 2¾	6 8½	7 2¼	7 8	8 1¾	8 7½	9 1¼	9 7	10 0¾	10 6¾	11 0¼
24	2 6	3 0	3 6	4 0	4 6	5 0	5 6	6 0	6 6	7 0	7 6	8 0	8 6	9 0	9 6	10 0	10 6	11 0	11 6
25	2 7¼	3 1½	3 7¾	4 2	4 8¼	5 2½	5 8¾	6 3	6 9¼	7 3½	7 9¾	8 4	8 10¼	9 4½	9 10¾	10 5	10 11¼	11 5½	11 11½



Replace slow handwork and obsolete tools with modern, speedy Black and Decker Electric Tools. They cut deeply into your cost problem, achieving faster, better performance per man, per hour, per tool. Black and Decker produce the world's most comprehensive tool line, each one engineered for today's exacting demands. Black and Decker offer you precisely the right tool for every job in your business!

Ask your nearest distributor for help in cutting costs.

WHENEVER AND WHEREVER REQUIRED, SPECIFY

Black & Decker

PORTABLE ELECTRIC TOOLS

NEW SOUTH WALES: Bennett & Wood Pty. Ltd., McPherson's Limited, Warburton Franki Ltd. **NEWCASTLE:** Bennett & Wood Pty. Ltd., Warburton Franki Ltd. **QUEENSLAND:** Martin Wilson Bros. Pty. Ltd. **VICTORIA:** E. A. Machin & Co. Ltd., McPherson's Limited, Warburton Franki Limited. **SOUTH AUSTRALIA:** McPherson's Limited, Parsons & Robertson Ltd. **WESTERN AUSTRALIA:** William Adams & Co. Ltd. **TASMANIA:** W. & G. Genders Pty. Ltd., Hobart, Launceston, Devonport and Burnie.

For information and technical advice on



ESCALATORS AND LIFTS

From the planning stage
To completion of project

The knowledge gained and technical data used, in solving the problems of hundreds of widely different escalator and lift installations, are recorded in the Otis technical files.

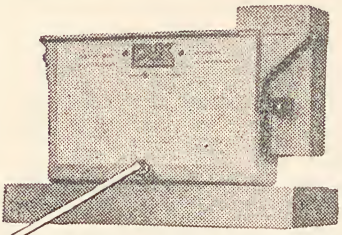
This information is readily available to all architects and construction engineers.

The Otis technical staff will gladly co-operate from the planning stage to the completion of your project.

Otis

ELEVATOR COMPANY PTY. LTD.
(Incorporated in Victoria)

SYDNEY • MELBOURNE • ADELAIDE
BRISBANE • PERTH • HOBART • NEWCASTLE



For lifetime reliability

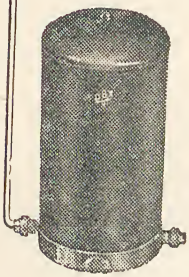
Install a DUX Electric Instantaneous Automatic Hot Water System.

DUX Instantaneous Electric Hot Water Systems are backed by a Company renowned for electric water heating appliances. This system is a "Gravity-feed" type (no storage tank required). The compact control unit fits through any manhole, while the heating unit (15" high) fits either under the sink, or under the house, whichever is the most convenient. Fully automatic, instant, unlimited hot water supply. Switches "on" and "off" with the turn of the tap.

Price £23/6/- (5-7-51)

(Complete system, including control unit, drip tray, heating unit and contactor.)

Delivery: approx. four weeks.



Other DUX Water Heaters:

DUX Porcelain Bath Heater.
Supplied to serve Bath only, bath and shower or bath-shower and hand-basin as desired.

DUX Standard Metal Bath Heater.

DUX 12½ gallon single phase Bath Heater, Bath Only or Bath and Shower.

DUX Porcelain Sink Heater.

Order through your Electrical House, builders' supplier or direct from:

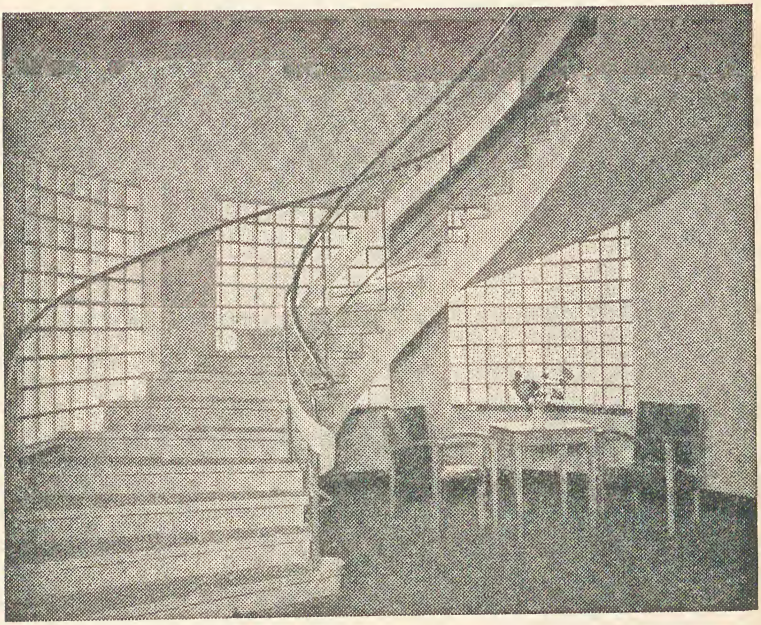
DUX HEATERS PTY LTD
15 Hamilton Street,
SYDNEY.

Write for Leaflet.

DUX
ELECTRIC WATER HEATERS

"Insulux" GLASS BRICKS

There's a place in EVERY job for "INSULUX" glass bricks



The above shows an ideal use of "INSULUX" for the lighting of stairway and vestibule. This is one of the most popular and logical uses for "INSULUX" as they require practically no maintenance, no curtaining, and give an abundance of diffused daylight where it is required.

Specifications and constructional details from the manufacturers:

AUSTRALIAN WINDOW GLASS Pty Ltd.

(INCORPORATED IN VICTORIA.)

P.O. Box 18, Alexandria, N.S.W. Telephone: LA 3331 (8 Lines).

or from our Interstate Offices:

420 SPENCER STREET, MELBOURNE, VICTORIA.
CAMPBELL'S BUILDINGS, CREEK STREET, BRISBANE, QUEENSLAND.
AROONA ROAD, KILKENNY, SOUTH AUSTRALIA.
MUNSTER HOUSE, 359 MURRAY STREET, PERTH, WEST AUSTRALIA.

CEMENT & CONCRETE ASSOCIATION OF AUSTRALIA is an organization established by the Portland Cement Manufacturers of Australia for the purpose of improving and extending the use of Cement and concrete along sound scientific lines.

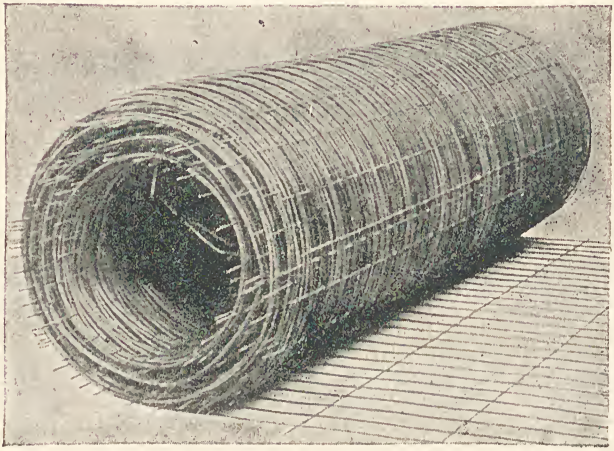
Its policy is directed towards the provision of an expanding service to the users of Portland Cement, aimed principally at assisting them in the solution of any problem in the use of cement and concrete that may confront them. The Association is in no sense of the word a sales or marketing organization.

As part of its service the Association has founded an up-to-date library which you are invited to use freely; and it has established affiliations overseas in order that the benefits of cement and concrete research abroad may be more freely available in Australia. At the same time every encouragement is being given to Australian research and education.

The Association will welcome the submission of your problems to it. Technical men possessing a first-class knowledge of cement and concrete will assist you.

Cement & Concrete Association of Australia

14 SPRING STREET, SYDNEY. Phone: BU 3071



B.R.C. Fabric

B.R.C. Reinforcements are suitable for all types of concrete work.

In all B.R.C. Fabrics machine spacing of wires ensures accuracy, and electrically welded joints ensure permanency.

Manufactured in Australia, and supplied by

A.R.C. ENGINEERING CO. Pty. Ltd.

Specialists in Reinforced Concrete Design & Suppliers of Reinforcement.

14 SPRING STREET, SYDNEY. Phone: BW 2271.
430 Little Collins Street, Melbourne. Phone: MU 7141.



White Portland Cement Specialities, Materials and Usage

Since the resumption of peace-time associations following World War II, White Portland Cement Specialities, inclusive of "Snowcrete" (White Portland Cement), "Snowcem" (Decorative Waterproof Cement Paint), "Colorcrete" (Coloured White Portland Cement) and "Impermo" (Waterproofing Compound for all forms of Portland Cement work), have been made available to Australian builders, concrete industrialists, painters and plasterers.

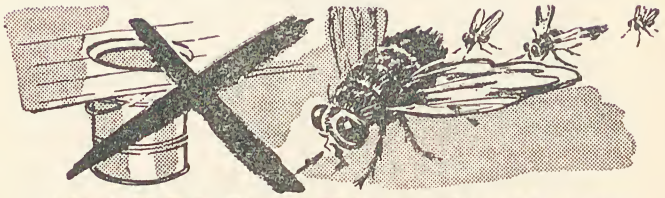
"SNOWCRETE" and "COLORCRETE" can be used successfully in the supply of Artificial Stone, Terrazzo Paving, walling, pre-cast units such as paving slabs, lintels, bricks, fencing posts, crazy paving, kerbs, roads, footpaths and cycle tracks laid "in situ," bridges, reinforced concrete buildings, concrete playgrounds, swimming pools (internal and external), pedestrian crossings laid "in situ" or in pre-cast units, floor and wall tiles, renderings of all descriptions for houses and buildings and similar internal or external work, pre-cast lighting and power poles, monumental or mortuary work.

"SNOWCEM" is becoming well-known in Australia as an efficient White Portland Cement based cold-water cement paint (in powder form) which, properly applied to affinitive surfaces such as medium hard, soft porous or hard (no suction) brick work, concrete, "in situ or cement," sand renderings, wall or fibre boards (such as Caneite), rough cast or pebble dash and, with appropriate care of application, to asbestos cement sheets, provides an economic and efficient coating which bonds itself to the backing to which it is applied.

Complete data on these materials is now available to all interested from the sole marketing organisation in Australia:

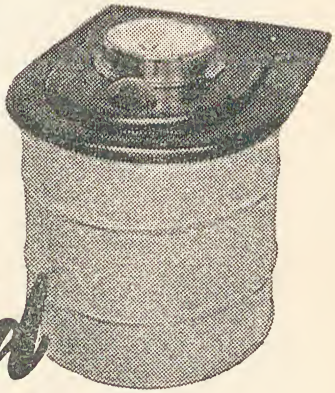
THE CEMENT MARKETING COMPANY (AUST.) PTY. LTD.

21 PIER STREET, SYDNEY. 'PHONE: MA 6816.
G.P.O. BOX 5215, SYDNEY.



PROTECT YOUR FAMILY FROM DISEASE

Let Sani-Lid the modern hygienic Lavatory safeguard your home from the menace of filthy disease-carrying flies. With new improved concentrated chemicals, Sani-Lid keeps the pan completely hygienic, is completely odourless and fly-repellent, and needs no water. Used in Government Departments and hospitals in unsewered areas, Sani-lid is your insurance against infection.

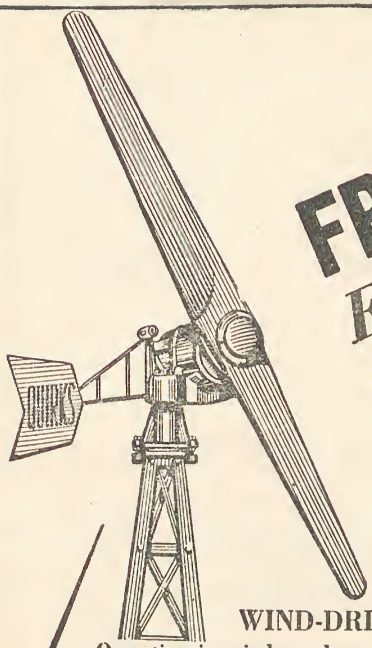


Sani-Lid

◇ ◇

Sani-Lid Chemical Co.

229 Castlereagh Street, Sydney. Phone : M 3114.



FREE! Electricity from the wind

for Country Homes

with a QUIRK'S WIND-DRIVEN LIGHTING PLANT

Operating in winds as low as 5 m.p.h. this set will provide economical electricity for lighting and household appliances. Supplied as a complete unit with batteries, or as an addition to your present engine-driven plant, the saving in fuel and upkeep will amply repay the purchase price.

● NO RUNNING OR UPKEEP COSTS

Quirk's Windlite plants cost nothing to run — need no attention whatever apart from yearly change of oil.

● CHARGES IN LIGHT WINDS

Operated in winds as low as 5 m.p.h. Positively self-governing in high winds.

LASTS A LIFE TIME

Frictionless bearings and hardened steel shaft with positive lubrication eliminate wear. Available in either 12, 32, 50 or 110 volt sizes. Every unit is fully guaranteed and backed by 40 years' experience of Windlite manufacture.



QUIRK'S VICTORY LIGHT CO.

229 CASTLEREAGH ST., SYDNEY. 'PHONE: M 3114

Save TIME, MONEY and Job Space

IT is EASY with

Direct from PHONE to FORM

READY MIXED CONCRETE

Concrete Guaranteed to Specifications.

"ONE YARD OR THOUSANDS."

DELIVERIES DAY OR NIGHT IN METROPOLITAN AREAS.

Large Fleet of Rex Moto-mixers at Your Service.

●

READY MIXED CONCRETE

(NEW SOUTH WALES) PTY LTD.

P.O. Box 3425, G.P.O., Sydney.

SYDNEY DEPOTS:

Rozelle—Phones: WB 2091-2-3.
Mort Street, Granville—UU 1162.
Banksia and Ocean Streets, Botany—MU 2951.

REGISTERED OFFICE: 10 MARTIN PLACE, SYDNEY.
Also at Melbourne, Brisbane, Adelaide and Canberra.



Five notable WESCO Paint Products

WESCO, THE PERFECT WATER COLOUR
The recognised Kalsomine for purity of tones and velvet-like finish. Its quality never varies.

RESIREX SYNTHETIC RESIN PAINT
Specially formulated for the external decoration and preservation of asbestos cement sheeting—even roofs.

BONCOTE CEMENT PAINT
Tough "bonding" finish for cement-rendered, concrete, brick and masonry surfaces.
Beautifies, weatherproofs.

DURABLO, AN UNDERCOAT PAR EXCELLENCE
Particularly for fibrous plaster sheeting.

SURFIX—THE NEW PLASTIC PATCHER
Different . . . better. For permanently patching all types of surfaces.

Obtainable from your regular paint supplier.

WESCO (Australia) PTY. LTD.

PARRAMATTA, N.S.W.



So wide is the variety of shapes, so attractive the decorative finishes in Australuco Aluminium Extrusions that they offer the Architect boundless scope in creating utilitarian or ornamental designs. Consult our Engineering Sales Service on your light metal problems.

"WHEN IT RUSTS, IT'S NOT ALUMINIUM"

AUSTRALIAN ALUMINIUM COMPANY
PROPRIETARY LIMITED

(Incorporated in the State of Victoria)

Sales Offices:

N.S.W.: P.O. Box 12, Granville. 'Phone: UU 2321.
VIC.: 77 Bridge Road, Richmond. 'Phone: JA 3951.
QLD.: P.O. Box 725K, G.P.O., Brisbane. 'Phone: B 7483.
S.A.: P.O. Box 943H, G.P.O., Adelaide. 'Phone: Cent. 7782.

47965



The international stamp of quality in Air Conditioning and Refrigeration

Australian Head Office and Factory

YORK AIR CONDITIONING REFRIGERATION (AUST.) PTY. LTD.

163 PHILLIP STREET, WATERLOO

Y1-49

TERAZZO
& CO. PTY. LTD.

SPECIALISTS

in

CONCRETE & PAVING

FACTORY FLOORS, FOUNDATIONS
AND ROADS

•

TERAZZO WORK

OF ALL KINDS
SUPPLIED AND FIXED

•

FOR PARTICULARS AND QUOTES
PHONE:

MX 2086 ———— MX 3635

O'RIORDAN STREET, ALEXANDRIA.

REASONS WHY . . .

Fibrous Plaster should be specified for all Buildings and Dwellings.

---

(1) Absolute permanence.
(2) Only plastic material known that will not destroy tints and colouring.
(3) Can be painted immediately.
(4) Is germ-proof and vermin-proof.
(5) Being a non-conductor, ensures warmth in winter and coolness in summer.
(6) Can be used in all styles of architecture.
(7) Being light in character, requires no heavy timbering.
(8) Walls of continuous sheeting leave a perfect face for decoration.
(9) Being fully reinforced, all cracks in walls and ceilings are eliminated.
(10) No patching and repairs as with old method lath and plaster.
(11) Will not conduct sound.
(12) Is absolutely fire-proof.
(13) Is superior to all substitutes and entirely Australian.

Fibrous Plaster Association of New South Wales
24 BOND STREET, SYDNEY.
Telephone: BW 2829.

"FOR SERVICE"

WATSON & CRANE

PTY. LTD.

MANUFACTURERS and SUPPLIERS of

PLUMBERS' QUALITY BRASSWARE

Plumbing, Hot Water, Steam & Building Materials.

Our Stocks cater for all Plumbers' Needs and include Fire Hose & Fittings, Ideal Hot Water Boilers, Gas & Electric Hot Water Systems, & Sanitary Ware.

"WATCRANE" SPRING & REFRIGERATOR COCKS.

Electro-plating of all descriptions. Chrome & Nickel-plating of made-up plumbing connections a specialty.

PAINTS AND PAINTERS' REQUISITES



Offices & Showrooms:
373-375 PITT STREET,
SYDNEY.

Phones:
M 2181, MA 7431
(8 lines)

Works:

PARRAMATTA & BRIDGE ROADS,
CAMPERDOWN.

Phones: LA 1438, LA 1460

The Trussed Concrete Steel Coy (Aust.) Pty Ltd.

16-18 O'CONNELL STREET, SYDNEY, N.S.W.

Telephone: BW 4108 (3 lines).

DESIGNERS AND SUPPLIERS
OF
REINFORCING STEEL

•

LUGSTEEL BRICK REINFORCEMENT

•

STRUCTURAL STEEL FRAMES

★

Agents for:

PATENT ROD TRUSSES AND CONSTRUCTIONS

•

PATENT FARM GATES

•

PATENT SUN-BEAM STRUCTURAL MEMBERS

•

TUBULAR SCAFFOLDING

TILES

When thinking of tiles you would be well advised to consult experts in this particular field — Dillons are specialists and have had wide experience in supplying and fitting of all types of wall and floor tiles.

Call in at Dillon's spacious showrooms in the centre of Sydney and see the wide range of tiles available.

Arthur H. Dillon Pty. Limited cater for the individual tastes and requirements of even the most exacting home builder.

For tiles of distinction ring Dillons for a free estimate.

TILES

ARTHUR H. DILLON PTY. LTD.

The Tile Specialists

89B York St., Sydney BX 3921

BUILDERS!

when you think of

INSURANCE

think of your own company

THE MASTER BUILDERS' INSURANCE CO. LTD.

Which Specialises in
INSURANCE SERVICE FOR BUILDERS.

All Classes of
FIRE AND ACCIDENT INSURANCES
effected, including WORKERS' COMPENSATION, Public Risk, Personal Accident, Plate Glass, Motor Vehicles and Houseowners' and Householders' Comprehensive Insurances.

For information or immediate cover:
Telephone: BU 3054.

Applications for Agencies Invited.

The Master Builders' Insurance Co. Ltd.
16-20 BRIDGE STREET :: SYDNEY
Branch Offices in Melbourne, Brisbane and Adelaide.

Subscribe to . . .

BUILDING MAGAZINE

Published Monthly. Profusely illustrated with the latest records of Building development in Australia and abroad.

Subscription 30/- a year in advance.

Subscribe to . . .

Construction

Published weekly. The official organ of the Master Builders' Association of N.S.W. Contains all the latest tender information and prices of Building Materials.

Subscription 42/- a year.

Published by . . .

Building Publishing Co. Pty. Ltd.

PRINTERS *and* PUBLISHERS

20 Loftus Street, Sydney :: Phone: BW 1548

RUBBER FLOORING

THE FLOORING OF THE FUTURE AVAILABLE TODAY

For full details of
Quality, Colours, Widths, Etc.,
see article on page 447.

or

Write or Phone

G. A. Bradford & Co. Pty. Ltd.
RUBBER DIVISION
Elliott House :: 66-72 Reservoir Street, Sydney
Phones: MA 9311 & MA 9312

Beautiful Firesides

Surrounds available for open, and gas and electric fires, Kosi and Wonderheat Stoves — write to Wunderlich Ltd.— Branches all States — for Booklet of Designs.



Wunderlich
FIREPLACE SURROUNDS
OF GLAZED TERRA-COTTA

SANDSTONE,
TRACHYTE & GRANITE

For enrichment and permanence
WE CARRY LARGE STOCKS OF ALL
AUSTRALIAN AND IMPORTED GRANITES
for
BUILDING FACINGS, STEPS AND PAVING
AND ALL OTHER PURPOSES.
Manufacturers of Grindstones and Rolls for Industrial Purposes.

•

LOVERIDGE & HUDSON
PTY. LTD.
BROWN STREET, LEWISHAM, SYDNEY.
Phone: LM 1439 (2 lines).

• MARBLE
• TERRAZZO
• CEMENT PAVING

Gamble & Dreelin Pty. Ltd.
Maddison Lane,
Redfern MX 2117

The Best Material for Roofs, Floors and Dampcourse.

NEUCHATEL
MASTIC ASPHALT

is composed of:

NATURAL MINERAL
ROCK ASPHALT
TRINIDAD NATIVE LAKE BITUMEN
SELECTED LOCAL AGGREGATES
and is SUPPLIED AND LAID
SOLELY BY

NEUCHATEL ASPHALTE CO. (AUSTRALASIA) Pty Ltd.

ASPHALT AND INSULATION CONTRACTORS

Sole Distributors of:
Trinidad Bitumen—Val De Travers Rock Asphalt—
Vermiculite Unifil Brand (Heat and Cold) Insulation Products.

247 GEORGE STREET, SYDNEY.
Telephone: BU 5494 (2 lines).
BRANCHES IN ALL STATES.

FOR
DEPENDABLE SERVICE
SPECIFICATION QUALITY
ASSURED SUPPLIES
Specify and Order

B M G

PAVING AND CONCRETE AGGREGATES

Quotations freely given for direct road delivery in Metropolitan Area and South Coast Districts or F.O.R. Railway Stations.

CRUSHED BLUE METAL AND GRAVEL
2½" 1½" ¾" ½" ⅜" 3/16"
WASHED AND GRADED ROUND GRAVEL.
WASHED RIVER SAND.

BLUE METAL & GRAVEL

PTY. LTD.
34 MARTIN PLACE - - - - SYDNEY
PHONE: BW 2106

A FULL RANGE!

DUNLOP

RUBBER AND INDUSTRIAL EQUIPMENT
INCLUDING

FLOOR COVERINGS
SEMTEX MASTIC TILES

DUNLOP RUBBER AUSTRALIA LIMITED
27 Wentworth Avenue, Sydney
BRANCHES IN ALL STATES

" FLOORATEX "

COMPOSITION FLOORING.

Jointless, Comfortable, Hygienic, Durable.

(See Information, Pages 33-34.)

WRITE or RING for ADVICE and QUOTES.

KEPPIE MACMAHON & CO.

48 GLEBE ROAD, GLEBE.

Phone: MW 1813.

SYDNEY COLLEGE OF ENGINEERING AND ARCHITECTURE

with which is incorporated

THE SYDNEY SCHOOL of MECHANICAL DRAWING

Founded by Telford Martin.

ESTABLISHED OVER 40 YEARS.
TECHNICAL EDUCATION BY INDIVIDUAL INSTRUCTION ONLY.

Day and Evening sessions. Mechanical Drawing, Pure and Applied Mathematics, Architectural Drawing, Building Construction, Quantities, Design, etc.

Special Course available for persons engaged in the Building Trades.

A. B. ROBINSON, A.M.I.E. (Aust.), Director.

DANKS' BUILDING, 324 PITT STREET, SYDNEY.

Phone: MA 5955.

LINSEED OILS OF GUARANTEED QUALITY



There's a **"Meggitt Ltd."** or **"Blundell Spence"** Linseed Oil for every Painting or Manufacturing purpose. Wherever first quality linseed oils are required, specify either of these long-established and uniformly reliable brands, **"Meggitt Ltd."** or **"Blundell Spence."**

Manufactured by
MEGGITT LTD.
Head Office:
67 York Street, Sydney.
Box 1555, G.P.O., Sydney.
Works: Parramatta, Melbourne, Adelaide, Brisbane.

MEGGITT LTD and BLUNDELL SPENCE (B&S) LINSEED OILS

BITULYND

CORROSION-PROOF

WATER PIPES

•

Best quality GALVANISED IRON PIPES with internal bitumen lining.

— SAVES INTERNAL CORROSION.
— MAINTAINS FULL BORE CAPACITY.
— GIVES LONGER LIFE AND REDUCED MAINTENANCE COSTS.

Approved by Water Authorities in New South Wales and throughout Australia.

All sizes: ¼ inch to 6 inch.

Patentees and Sole Manufacturers:

PIPE LININGS AUST. PTY LTD.
222-224 COWARD STREET, MASCOT.
Phones: MU 3141 — MU 3142.

TIMBER FRAME HOMES

TILED WITH

NEW STYRENE **GRIPTILES**

have distinctive luxury bathrooms and kitchens.
Griptiles are permanent and cannot fall off.

Can be applied to ANY WALL SURFACE.

(See description page 462.)

GRIPTILE PTY LTD.

REG. OFFICE: 115 PITT STREET, SYDNEY.

Business Address: 1st Floor, 149 Castlereagh Street, Sydney. MA 9516.

Obtainable from all leading hardware stores:
ANTHONY HORDERNS, DAVID JONES, GRACE BROS.,
R. DEAN CLARKE, C. DIMENT, NOCK AND KIRBY.



THE COLONIAL SUGAR REFINING CO. LTD.
BUILDING MATERIALS DIVISION.

Manufacturers of
Cane-ite Insulating Board, Ivory Cane-ite, Cane-ite Acousti-Tile, Low Density Cane-ite, CSR Hardboard, Gyprock Plaster Wallboard, CSR Floor Tiles, CSR Asbestos Cement Sidings, Concord and Brunswick Plasters. "Fibrobestos" Asbestos Cement Sheets, Mouldings, Deep Corrugated Roofing Sheets, Roofing Accessories.

THE COLONIAL SUGAR REFINING CO. LTD.
BUILDING MATERIALS DIVISION.

Sydney, Brisbane, Melbourne, Adelaide, Perth.

Largest Manufacturers of Building Materials in the Commonwealth.

New "De Luxe"

Silent Knight Refrigerator

£77/10/0
(Gas or Electric)

Also available

STANDARD MODEL

£72/10/0
(Kerosene, Gas or Electric)

Prices F.O.R. Sydney, Packing Extra.

HALLSTROMS PTY. LTD.
432 WILLOUGHBY RD., WILLOUGHBY, N.S.W.

NONPORITE PTY. LTD.



WATERPROOFING
HARDENING
COLOURING
ACIDPROOFING
CAULKING
REFRACTORY
ROOFING
CEMENTS & SHAPES

AGENTS ALL STATES. (See Telephone Directory.)
292 Burwood Road, Hawthorn, E.2, Victoria.

Redondo Tile Company [Aust.]

manufacturers of

GLAZED CERAMIC WALL TILES

Cream and Colours available in 4" x 4" or 6" x 6" square edge finish.

★

Factory:
DOWLING STREET,
WATERLOO,
N.S.W.

Telephones:
MX 3381
MX 0455

Sterling QUALITY PAYS

Sterling Prepared Paint—for durability and gloss.

Sterling Heavy Bodied Whites—"Savox": a Zinc and Titanium blend for extra whiteness and coverage. Sterling HBW 90/10; Sterling HBW 60/40. Use with high power Supatint stainers.

Rayflex Endurance Finish (Blue Label)—a synthetic base finish tough enough for harsh marine use, beautiful enough for your home.

Rayflex Long Gloss Paint (Red Label)—keeps homes younger longer.

Use also Hometone Flat Oil Paint and Mattsheen Satin Finish, for interior decoration.

Sterling Paint & Varnish Co. Pty. Ltd.

Sydney Phone: MX 3356 Branches all States

For The Building and Allied Trades—

Zions' Wages Books in various sizes.

„ Loose Time & Wages Sheets.

„ Business Income Tax Recorders.
(To facilitate the preparation of Income Tax Returns.)

„ Apprentice Forms for all trades.

„ Builders' Agreement and Tender Forms.

Griffith 40-Hour Week Wages Calculators.

Time Recorders and Watchmen's Clocks.

Printed, Published and Supplied by:

Zions Industrial Arbitration Act Time Sheet Offices

8a Castlereagh Street (near Hunter Street), Sydney.

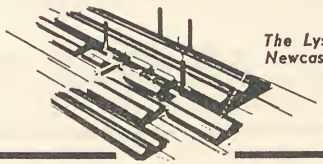
Telephone: BW 9730.

The following data sheets are now included in the LYSAGHT COUNTRY PLAN SERVICE:

IMPLEMENT, GRAIN AND CHAFF SHEDS
•
POULTRY SHEDS
•
SILOS
•
PIGGERIES
•
SHEARING SHEDS
•
TANKS
•
DAIRIES

LYSAGHT looks ahead

Although galvanized iron is still difficult to secure in many districts, LYSAGHT LOOKS AHEAD to the day when full requirements can be met. In the meantime a special COUNTRY SERVICE DEPARTMENT has been established to assist the country user of the company's products, with data sheets covering the construction of a wide range of farm buildings. To secure this helpful information write the SERVICE DEPT., John Lysaght (Aust.) Pty. Ltd., 33 Macquarie Place, Sydney, N.S.W.



The Lysaght works, Newcastle, N.S.W.

GUNITE

PNEUMATICALLY PLACED CONCRETE BY THE CEMENT GUN

FOR

REPAIRS TO BRICK AND CONCRETE STRUCTURES.
PROTECTIVE COATINGS ON STEEL.
LININGS FOR RESISTANCE TO ABRASION AND CHEMICAL ATTACK.
WATER CHANNEL, SEWER AND PIPE LININGS.
SPECIALISED CONSTRUCTION OF CHIMNEY STACKS.
GROUTING STONE EMBANKMENTS AND WALLS.
REFRACTORY LININGS.
PROTECTION OF TIMBER PILES AGAINST MARINE BORERS.
CONSTRUCTION OF SWIMMING POOLS.

CONTRACTORS IN "GUNITE" AND SELLING AGENTS FOR CEMENT GUNS.

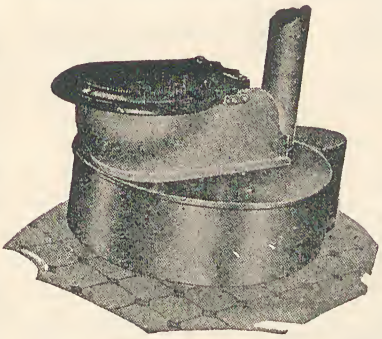
CEMENT GUN Pty Ltd.

Endeavour House,
33 Macquarie Place,
Sydney.
Phone: BU 3371.

Orb House,
70-84 Clarendon Street,
South Melbourne, S.C.5.
Phone: MX 4761.

MODERN SANITATION
IN UNSEWERED AREAS.

The HYGIEA DISSOLVENATOR



NO GERMS
NO ODOURS
NO FLIES
NO EMPTYING

NO WATER SUPPLY NECESSARY.

ANY HANDYMAN CAN INSTALL IT.

Sewage material is chemically transformed into a sterile solution that runs away into the soil.
(See description page 472.)

Hygiea Sanitary Co. Pty. Ltd.
26-30 BRIDGE STREET, SYDNEY.
(Established 22 Years.)
Write for Free Illustrated Pamphlet.

AGENTS ALL STATES.

ONLY

HURLINGE

offers ALL these advantages:

TIME-SAVING
NO REBATING
SELF-GAPPING
SELF-ALIGNING
EASY, ACCURATE FITTING
4" for DOORS.
3" for CASEMENTS.

All Hardware Stores or

ROBERT DOUGLAS PTY. LTD.
39 SUSSEX STREET, SYDNEY. BX 3895.
Wholesale Distributors.

Consolidated Porcelain Enamels Pty. Ltd.

ARUNDEL STREET, GLEBE, SYDNEY.

Manufacturers of
Modern Porcelain Shop Fronts,
Porcelain Advertising Signs, Panels, Etc.

Phone: MW 2814 (6 Lines)
For Quotation.

STEEL WIRE ROPES

"THE SINEWS OF AUSTRALIAN INDUSTRY"

Manufactured at Newcastle, N.S.W.

by

The Australian Wire Rope Works

PTY. LIMITED.

Prices and Particulars from the Company's Distributors:

BULLIVANT'S AUSTRALIAN CO. PTY. LTD.

62-64 O'RIORDAN STREET, ALEXANDRIA.

(See Tables on Pages 457-458.)

Inside and Out-



HOMES THROUGHOUT AUSTRALIA ARE FITTED WITH

"ABERDEEN" (REG.)
CLIMATE CONTROL BLINDS.

Turn your verandah or porch into a useful extra room, add friendly charm to your front door. Smooth running "Aberdeen" (Reg.) Climate Control Blinds come to you in an exclusive range of gay lively patterns to transform your home into a pleasing picture of cheerful beauty and year-round comfort.

"ABERDEEN" (PAT.)
ALL METAL VENETIANS.

Make your rooms more attractive, more livable, with colourful "Aberdeen" All Metal Venetians. The flexible metal slats have a baked-on plastic finish which is so easy to keep clean. "Aberdeen" Venetians are made in lovely pastel shades that will blend with any decorative scheme. Send for FREE sample slats and illustrated booklet.

"Aberdeen" BLINDS

Obtainable from leading stores—or Write, Call or Phone:

SMITH COPELAND & CO. PTY. LTD.

33 REGENT STREET, SYDNEY. PHONE: M 4181-2-3.

Makers of Finer Blinds and Canvas Goods for over 56 Years.



TRACTOR SERVICE INFORMATION

● The manner in which a tractor is operated and cared for during the *first* 100 *working hours* determines its future life and its freedom from unnecessary trouble and delays. The duty of every operator placed in charge of a tractor is *to adhere strictly to instructions received* when the machine is delivered, and to the regular care and maintenance schedule found in the tractor's Instruction Manual.

Your tractor is a fine machine—and it deserves your care. You'll find extra dividends in keeping it in the best condition.

SERVICE is the keynote of the Oliver organisation. Throughout Australasia, from every Distributor, you can at all times depend upon friendly, helpful service—designed to keep your tractor and equipment operating at its best!

DISTRIBUTORS OF OLIVER TRACTORS AND BRITSTAND EQUIPMENT:—

QUEENSLAND: U.K. & Dominion Motors,
365-379 Wickham Street, Brisbane.

N.S.W.: Britstand Distributors Limited,
56-64 Gardeners Road, Mascot, Sydney.

VIC. & TAS.: Queen's Bridge Motor & Engineering Co. Pty. Ltd.,
31-43 Queen's Bridge Street, Melbourne, S.C.4.

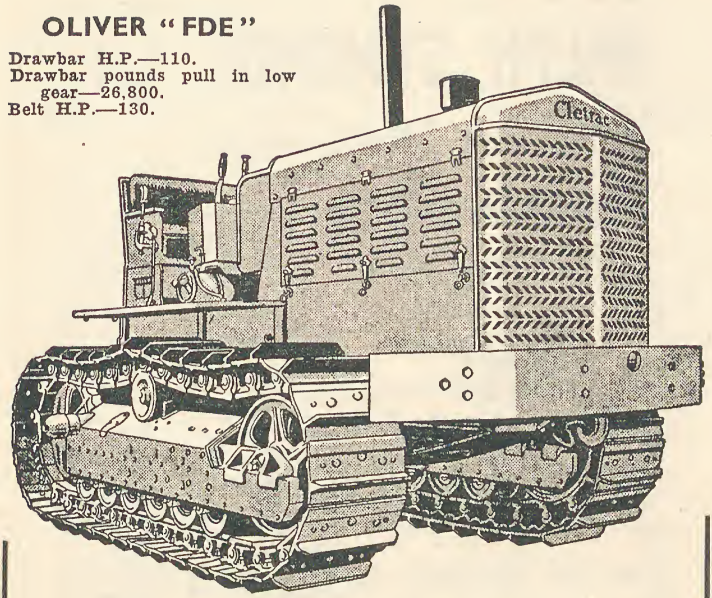
STH. AUST.: Waymouth Motor Company Limited,
42 Waymouth Street, Adelaide.

WEST. AUST.: Skipper Bailey Motor Company Limited,
900 Hay Street, Perth.

N.Z.: Frederic W. Smith Limited,
Nathan's Buildings, Grey Street, Wellington, C.1.

OLIVER "FDE"

Drawbar H.P.—110.
Drawbar pounds pull in low gear—26,800.
Belt H.P.—130.



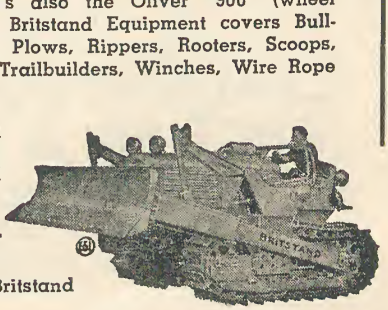
OLIVER-BRITSTAND

The Quick - Earning Combination!

● Team an Oliver Tractor with Britstand Equipment for the best investment you've ever made—one that will return you solid dividends in time and money saved, year after year!

Industrial crawler tractor models include the "BD," "BDH," "DDH" and "FDE." There's also the Oliver "900" (wheel type). The wide range of Britstand Equipment covers Bulldozers, Front End Loaders, Plows, Rippers, Rooters, Scoops, Scrapers, Tamping Rollers, Trailbuilders, Winches, Wire Rope Snotters.

See your Oliver - Britstand Distributor (listed on Page 48 under "Tractor Service Information.") He will gladly give you full particulars.



● OLIVER "DDH" with Britstand Hydraulic Trailbuilder.

RALPH SYMONDS LTD.

'Phone: MU 1471 (5 lines). Telegrams & Cables: "VENEERS," Sydney.
MORLEY AVENUE, ROSEBERY.

MAKERS OF . . .

"RESWOOD" PLYWOOD

TROUBLE FREE
PLASTIC BONDED
FULLY WATERPROOF

including Specialities such as—

- **GIANT** "RESWOOD"—

in 25 feet x 7 feet sheets, in one piece

- FIGURED "RESWOOD"—

in choice Australian and Exotic Cabinet Timbers

- PLASTIC SURFACED "RESWOOD"—

Ready Polished Panels, resistant to Heat, Moisture, Acids, etc.

- **FIREPROOFED** "RESWOOD"—
- METAL FACED "RESWOOD"—

in Stainless Steel, Aluminium, etc.

Designers and Manufacturers of

LAMINATED TIMBER ARCHES & GIRDERS

AND
OTHER SPECIAL PATENTED WOODEN CONSTRUCTIONS.

ALL TIMBER AND PLYWOOD PROBLEMS OUR SPECIALITY.

TRULINE
Brick Machines



SPECIAL TRULINE BRICK-MAKING MACHINE

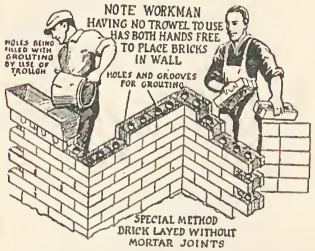
TRULINE cement brick-making machines are approved and acclaimed by Dept. of Works and Housing, Commonwealth Experimental Building Station, Ryde, N.S.W., and other local council authorities.

TRULINE cement brick-making machines ensure a reliable supply of bricks when and wherever required. As suitable materials, sand, gravel, ashes, and cement are practically always available, the possibility and advantages of **TRULINE BRICK MACHINES** are unlimited.

Brick construction has numerous advantages over other building materials in outlying districts in that fire risks are lessened, upkeep reduced, white ant problem eliminated, and climatic conditions equalised.

The machines are semi-automatic, simple and easy to operate, factory tested and ready to use.

Bricks made in **TRULINE** machines are of first-class quality and can be coloured or mottled if so desired.



STANDARD MACHINE

Bricks of standard shape and size, 9in. x 4⅜ x 3in., are produced in this machine.

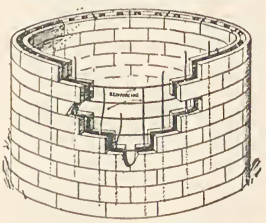
Overall Dimensions of Both Machines:
Height, 5ft. 4in.
Approx. Weight, 350lb.
Base, 20in. x 18in.

Full details and prices on application.

SPECIAL (New Method) MACHINE

This machine produces bricks of a special design which makes possible the use of unskilled labour in laying. Type of brick and New Method process of laying is shown in illustration. Bricks suitable for circular work, such as silos, tanks, etc., are made in this machine by using extra moulds. New Method bricks are 9in. x 4½in. x 3in.

SPECIAL METHOD CONSTRUCTING TANK or SILO



NOTE REINFORCING SYSTEM

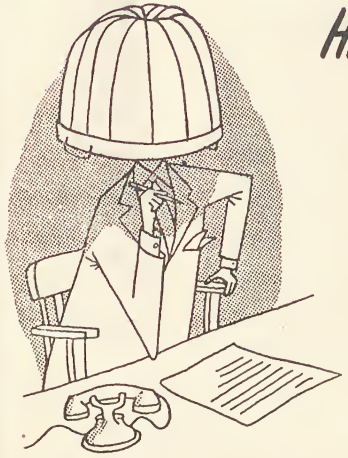
TRULINE BRICK MACHINE CO.

84-86 HENDERSON ROAD

MX 3771 ALEXANDRIA, N.S.W. MX 3771

After Hours: JB 2963, XL 2318, FX 5167

are you suffering from



HIDDEN TALENTS?

Helping men and women bring out the best that's hidden in them has been the work of I.C.S. for 58 years through their spare time, home study courses.

The key to unlock YOUR capabilities is TRAINING . . . sound, practical, down-to-earth I.C.S. training either in your present occupation or in some new career. Don't be content to plod along in a routine job . . . qualify yourself for the rich rewards of success . . . security . . . better pay . . . more interesting work. The first step thousands of other successful men and women took was to mail this coupon. Do it NOW!

Write for FREE I.C.S. guide

INTERNATIONAL CORRESPONDENCE SCHOOLS

140 ELIZABETH STREET, SYDNEY

Dear Sirs — Please send me a free prospectus giving details of the course before which I have marked X.

DRAWING:	COMMERCIAL:	INDUSTRIAL:	COACHING:
....Architectural	....Accountancy	*All Branches of*	*Institutes of*
....Houseplanning	....Cost Accounting	....Mechanical Eng.	....Accountancy
....Mechanical	....Book-keeping	....Diesel Engines	....Secretarial
....Surveying & Mapping	....Station Book-kpg.	....Automobile	....Cost Accounting
BUILDING:	....Shorthand Typing	....Farm Eng. Maint'ce	....Mechanical Engrs.
....Architecture	....Business Admin.	....Read'g Blue pr'ts	....Electrical Engrs.
....Building Contracting	SELLING—DISPLAY:	....Air Conditioning	....Civil Engineering
....Carpentry, Joinery	....Salesmanship	....Welding	....Auto. Mech. Engrs.
....Quantity Surveying	....Retail Merchandsg.	....Chemistry	....Radio Engrs. (Aust.)
....Roofing Steel Square	....Advertising	....Plastics	....Engineers (Aust.)
....Concrete Eng'ng.	....Window Display	....Electronics	....Diesel Engineers
ILLUSTRATING:	EDUCATION:	....Electrical	....Local Govt. Elec. Engrs.
....Commercial Art	....Mathematics	....Radio	....Arch. Reg. Board
....Landscape—Still Life	....Good English	....Refrigeration	....Advtg. Assoc. of Aust.
....Cartooning	....Languages	....Aeronautical	....Marine B.O.T.
....Sketching	....Matriculation	....Civil Eng.	....Shire Engrs. Certificate
....Show Cards	....Leaving Certificate	....Industrial M'gmt	....Electricians "
....Ticket Writing	....Intermediate	....Production M'gmt	....Steam or I.C. Dvrs. "
WRITING:	....Q.Senior or Junior	....Textile	....Boiler Inspectors "
....Journalism	....Police Entrance	....Ocean Navigation	....Shire Overseers "
....Short Story Writing	....Nurses' Entrance	....Dress Making	....Mine Deputy's "
....Radio Play Writing	....C'wealth Clerical	....Dress Designing	....A/B Gde. Mot. Mechs.

NEW COURSES: Fashion Drawing and Designing; Cottage Carpentry.

If your subject is not shown above, write it here.....

NAME..... OCCUPATION.....

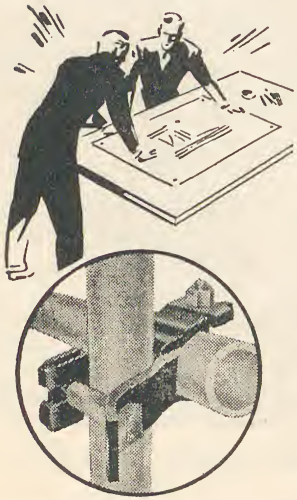
ADDRESS..... AGE..... 50/8

MILLS

STEEL

SCAFFOLDS

A Division of John Lysaght (Australia) Pty. Ltd.



For large or small scale scaffolding . . . wherever speed, safety and economy are important factors . . . MILLS is the answer every time. Capable of speedy erection, it saves labour and rigging costs . . . enables your staff to spend more time on the actual job. Available on hire and erected on the job if desired. Telephone the office nearest you for detailed estimates . . .

SYDNEY : 107 Fig St., Ultimo. MW 1089

NEWCASTLE:.. Lysaght's Works Pty. Ltd. MW 1361

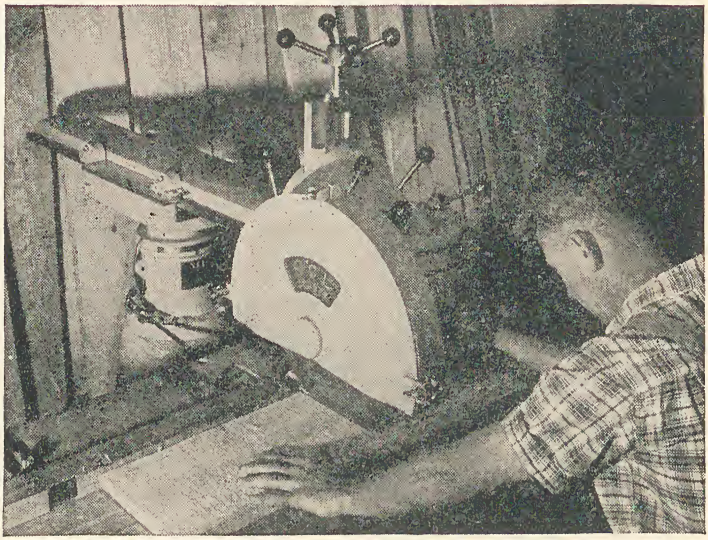
MELBOURNE: ...70-84 Clarendon Street, South Melbourne, S.C.5.: MX 4761 (4 lines)

M192-7258

THE

N.C.L. "UNIVERSAL"

Woodworking Machine



THE WONDER MACHINE OF 1001 USES

IT

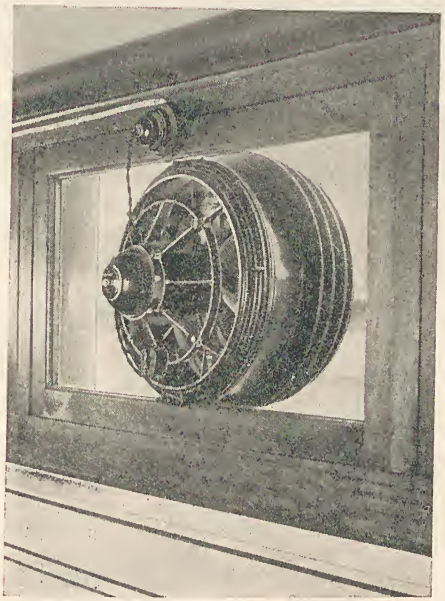
CROSS CUTS, RIPS, MITRES, BEVEL RIPS,
CUTS RAFTERS, TENONS, TRENCHES,
PLOUGHS, REBATES.

Details from

N.C.L. Engineering Co. Pty. Ltd.

28 MITCHELL ROAD, ALEXANDRIA, SYDNEY.
Phone: MX 1906.

VENT AXIA UNITS FOR BETTER VEN-TILA-TION



VENT AXIA UNITS ARE BRITISH MADE

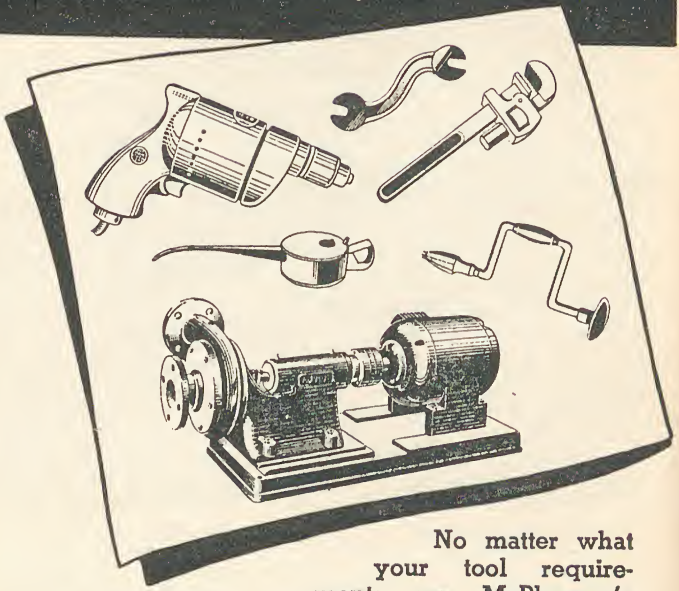
The unit is self-contained in a non-corrodible best quality plastic casing with weather-proof cowl on the outside; the motor (models available for either **AC or DC** current) is totally enclosed, preventing the entry of dust, dirt, or moisture.
"Vent-Axia" units are electrically driven from ordinary lighting or power circuit, and oil-containing bearings ensure extreme quietness in operation. The economical consumption per unit is rated at less than a small household globe. Particular attention is directed to the Fan Blades or Impellors, also moulded in quality Plastics on the latest principles of aero-dynamics. "Vent-Axia" units are available for immediate installation in three sizes, the "Silent 6," the "Silent 9," and "Industrial 12" —each unit handling specified areas with air displacement ranging from 8,000 cubic feet to 40,000 cubic feet per hour. Simplicity is the keynote of "Vent-Axia" ventilation and installation in any type of window, whether it be sheet, plate, fancy glass or leaded lights.

(See Article on Page 478.)

MANUFACTURERS SPECIAL PRODUCTS PTY. LTD.

47 YORK STREET, SYDNEY. Telephone: B 0522 (17 Lines)

McPherson's tools for every building purpose



No matter what your tool requirements are, McPherson's have building equipment to help you. Black & Decker Portable Electric Tools . . . Home Utility . . . Ajax Pumps . . . just a few of the famous lines available at McPherson's. Call in and see the big range for yourself.

McPherson's Limited

51-65 Bathurst Street, Sydney. M 0417
And at Melbourne, Adelaide and Perth

TELEPHONE : — BW. 1021 14 Lines.

MANUFACTURERS MERCHANTS

TRADE MARK

ESTD. 1867

CRANES

MANUFACTURERS OF

"STANWAY," "METEOR" & "PLANET"
PLUMBERS' BRASSWARE,
COPPER SHEETS, STRIP, ETC.

★

ALUMINIUM, ALUMINIUM ALLOY
SHEET, STRIPS, ETC.

★

SHEET METAL PRODUCTS.
GUTTERING, RIDGING, DOWNPIPES
AND FITTINGS IN ALUMINIUM,
COPPER & GALVANISED IRON.

★

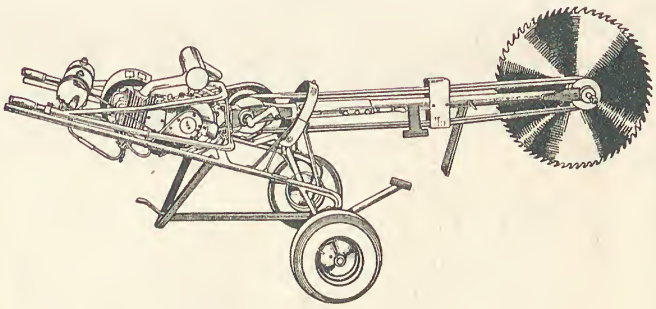
Distribution Through Merchant Houses Only.

★

G. E. Crane & Sons Ltd.

35 PITT STREET, SYDNEY.

Let *ONE* Man do the work of TWO!



with the patented

"HARGANS" Mobile

POWER SAW

The "Hargans" Patented Mobile Power Saw is invaluable to timber cutters for the cutting of mine props, caps, sleepers, firewood, and is ideal for general farm and station use.

Powered with a 4-cycle, 4½ h.p. British-built engine, the "Hargans" will take up to a 36-inch saw, and the featured "gimbal ring and saddle" mounting enables speed adjustment for horizontal, vertical or diagonal cutting. Its approximate weight is 2¾ cwt., and mounted on rubber-tyred wheels, it is easily handled by one man. From standing timber, one man operating a "Hargans" Saw can average 6 to 10 tons a day, according to locality.

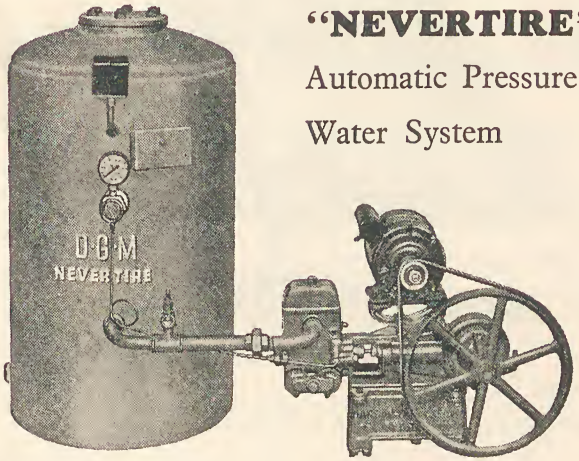
Sole Agents:

DANGAR, GEDYE & MALLOCH LTD.

MALLOCH HOUSE, 10 YOUNG STREET, SYDNEY.
Branches at: Wagga, Lismore, Newcastle & Melbourne.

CITY WATER PRESSURE

in Your Home—



"NEVERTIRE"

Automatic Pressure

Water System

Just a turn of the tap and you get all the fresh, clear water you need at city pressure in your house, yard or dairy. The "Nevertire" Automatic Pressure Water System operates from any electric supply and is sturdily built for years of economical service. Pressure is always maintained between 20 and 40 lbs., and the plant has a capacity of approximately 280 gallons per hour. The outfit is entirely automatic in operation, needing only periodic maintenance.

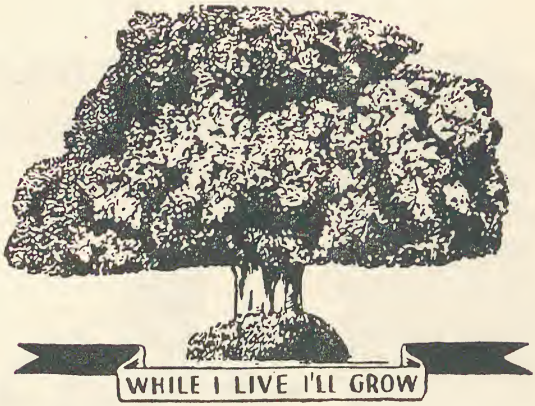
Sole N.S.W. Agents:

DANGAR, GEDYE & MALLOCH LTD.

MALLOCH HOUSE, 10 YOUNG STREET, SYDNEY.

Branches at: Wagga, Lismore, Newcastle & Melbourne.

"Truth in Advertising"



OVER

100 YEARS OF SERVICE

BACKING THE FIRM.

THIS IS WHY WE CAN SAY
ANTHONY HORDERNS'
STILL LEAD THE WAY FOR
THE FINEST SERVICE.

★

ANTHONY HORDERNS'

BRICKFIELD HILL, SYDNEY, N.S.W.



There's a Rheem Water Heater for Every Installation

Rheem Series 10

Mains Pressure, Floor mounting, Quick Recovery Gas Hot Water System.
Mod. 15—216 galls. in 12 hrs.
Mod. 35—300 galls. in 12 hrs.

Rheem Series 20

Floor mounting, Quick Recovery Gas Hot Water System.
Mod. 15—216 galls. in 12 hrs.
Mod. 35—300 galls. in 12 hrs.

Rheem Series 305

"In-the-roof" Electric Hot Water System.
Capacities 30, 45, 60, 80 galls.

Rheem Series 320

SQUAT "In-the-roof" Electric Hot Water System.
60, 80 galls. capacity.

Rheem Series 400

EXTRA SQUAT "In-the-roof" Electric Hot Water System.
Capacities 45, 60, 80 galls.

Rheem Series 330

"On-the-floor" Electric Hot Water System.
Capacities 30, 45 galls.

Rheem Series 340

Electric Storage—Bathheater, with shower fittings.
15 galls. capacity.

Rheem Series 350

Electric Dairy Waterheater.
15, 30, 45 galls. capacity.

Rheem Series 150

Kerosene Operated Hot Water System.
35 galls. capacity.

For further details and specifications consult:

ELECTRIC HOT WATER SYSTEMS

Electrical Equipment of Australia Ltd.
3 Barrack St., Sydney. BX 4503

GAS HOT WATER SYSTEMS
Coates & Co. Pty. Ltd., 302 Pitt St., Sydney. MJ 4601

RHEEM AUSTRALIA PTY. LTD. Sydney, Melbourne, Brisbane, Fremantle.

HADFIELDS
STEEL WORKS LTD

MITCHELL RD., ALEXANDRIA, SYDNEY, N.S.W.

Telephones: LA 2811 —— LA 3643.

STEEL CASTINGS and FORGINGS.
QUARRY EQUIPMENT.
MARINE CASTINGS.
DREDGING EQUIPMENT.
CRUSHING PLANTS.
MINING EQUIPMENT.
TAR MACADAM PLANTS.

STEEL PRODUCTS
OF ALL KINDS

PLAN-COPYING

•

BLUE-PRINTS
DYELINES
PHOTOSTATS

•

Made from all kinds of plans and documents. Maps and Drawings mounted. Tracings made.

•

SPECIFICATIONS, ETC., TYPED.

•

Return Mail Service for Country Work.

•

Phone: BU 1804.

H. E. GARRAWAY

16 Bridge Street, Sydney

Established 1893

TRADE MARKS OF AUSTRALIA'S LARGEST PLASTICS ORGANISATION

THESE trade marks are your guarantee of the best in plastics. Always specify NYLEX wire, tubing, bathroom and nursery accessories; DUPERITE light fittings, toilet seats and builders' hardware; LAMINITE sheets and tubes. They are products of Australia's leading plastics organisation.



MOULDED PRODUCTS (A'SIA) LTD.

Melbourne—Moulded Products (A'sia) Ltd., 165 Cremorne Street, E.1. JB 1551.

Adelaide—Moulded Products (S.A.) Ltd., 110 Pirie Street, Cent. 1620.

Perth — Moulded Products (W.A.) Pty. Ltd., 89 St. George s Terrace, B. 7337.

Sydney—Moulded Products (N.S.W.) Pty. Ltd., 137 Clarence St., BX 1071.

Brisbane—Moulded Products (Q'land) Pty. Ltd., 35 Charlotte Street, B. 2984.

Launceston—Moulded Products (A'sia) Ltd., 75 St. John Street, Launceston 259.

NV604

STEEL

Fabricators & Merchants

Suppliers and Fabricators of all types of Steel buildings, bridges, oil refinery equipment, conveyors, tanks, pressure vessels, boilers, etc., to all codes, including Lloyds Class 1 and A.P.I.

Industrial X-Ray work also executed.

BERNARD-SMITH

(PTY) LIMITED

STRUCTURAL ENGINEERS & STEEL MERCHANTS

Maddox Street, Alexandria, N.S.W.

Telegrams: "BERSMITHSTEEL."

Tels.: L 5026 (4 Lines).

TERRA - COTTA

ROOFING TILES

COMBINE

BEAUTY and DEPENDABILITY.

over **10,000**

Successful Roofs

COVERED BY

THE

NEWMAN-UNDERWOOD TILE CO.
PTY. LTD.

CAMBRIDGE ST., MERRYLANDS

ESTABLISHED 1919.

TELEPHONE —— UU 2543.



These all-steel, pre-fabricated buildings are suitable for stores, garages, machinery sheds and many other industrial, council and farm uses.

Due to material shortages, uncovered framework only can be provided at present. However, these buildings are designed to be covered with corrugated iron or fibro sheeting.

The 40ft. Armco building can be provided with alternative door arrangements and in lengths of any multiple of 15 feet. Uncovered frames are also available for Armco Pre-fabricated Steel Buildings in 20ft., 30ft. and 60ft. spans.

ARMCO

ARMCO

ARMCO (AUSTRALIA)
PTY. LTD.

Kembla Building, 58 Margaret St., Sydney; 422 Collins St., Melbourne; 319-325 Queen St., Brisbane; C.M.L. Bldg., 41 King William St., Adelaide

A16-48

STEELBILT LIMITED

Manufacturers of Adjustable Steel
Storage Shelving
Library Shelving
Clothes Lockers
Storage Cupboards
Filing Plan and Card
Cabinets

•

Have no hesitation in consulting our technical sales staff on your storage problems. Drawings and estimates prepared without obligation.

STEELBILT LIMITED

A WORMALD BROTHERS' INDUSTRY.
Head Office and Works:
85 Young St., Waterloo, Sydney. Phone: MX 3571

WHATEVER THE FIRE RISK

WORMALD BROTHERS INDUSTRIES LIMITED

HAVE A FIRE-FIGHTING APPLIANCE TO COVER IT!

Manufacturers of the world-famous "GRINNELL" Automatic Sprinkler and Fire Alarm Systems, WORMALD BROTHERS also produce and market the "SIMPLEX" range of Fire Extinguishers (see page 437), "MULSIFYRE" SYSTEMS for protection of large electrical risks, Sub-stations, etc. HYDRANT INSTALLATIONS, hose and fittings. "NATIONAL AER-O-FOAM" INSTALLATIONS for the protection of inflammable liquids. "LUX" C.O.2. GAS INSTALLATIONS for large industrial hazards and electrical risks.

Call on any of our branches at any time for expert advice and estimates . . . our service is entirely at your disposal.

The representative group of Companies controlled by

WORMALD BROTHERS INDUSTRIES LIMITED

also manufacture the following:

"WATERLOO" TINCLAD FIRE DOORS. (See page 436.)
STEEL ROLLER SHUTTERS and ROLLING GRILLES.
"METALBILT" ONE-HOUR TYPE FIRE DOORS. (See page 436)
"OVERHEAD" latest type of sliding doors for garages.
"BANGOR" sliding door track and fittings. (See page 433)
"ESAVIAN" door and window fittings.
"KIRSCH" metal blinds and curtain rods.
"STEELBILT" steel shelving, lockers and cupboards.

These products are sold by leading Hardware Stores throughout Australia and New Zealand. For full details, descriptive folders and prices, contact your nearest dealer or Wormald Brothers' establishment.*

* WORMALD BROTHERS INDUSTRIES

LIMITED (INC. IN N.S.W.)

Head Office: YOUNG STREET, WATERLOO, SYDNEY – MX 1071

WORMALD BROTHERS (EAST) LIMITED
Sydney, Newcastle, Wagga, Orange, Brisbane, Townsville.
WORMALD BROTHERS (SOUTH) LIMITED
Melbourne, Geelong, Ballarat, Perth, Hobart.
WORMALD BROTHERS (S.A.) LIMITED
Adelaide.
WORMALD BROTHERS (N.Z.) LIMITED
Wellington, Auckland, Christchurch, Dunedin.

Fire Protection Engineers since 1889.
Throughout Australia & New Zealand.

'PERSPEX'

CORRUGATED ACRYLIC SHEET
FOR ROOF LIGHTING



COR.3.X.9482

ICI

IMPERIAL CHEMICAL INDUSTRIES OF AUSTRALIA AND NEW ZEALAND LIMITED

HAWKESBURY SANDSTONE PTY. LIMITED

14 MARTIN PLACE, SYDNEY

ESTIMATES FOR ALL CLASSES OF MASONRY

SAWN, MACHINE DRESSED AND QUARRIED STONE, BALLAST AND RUBBLE

John Danks & Son Pty. Ltd.

SUPPLIERS OF:

All types of Hot Water Systems
Irrigation Requirements
Billabong Windmills
Builders' - HARDWARE - Domestic
Pump Equipment - Sanitary Ware
Wallpapers - Electrical Goods
Colours - Paints - Oils
Tools - General Plumbing Goods
ETC.

324-330 PITT ST., SYDNEY
M 6505 (18 Lines)

391 BOURKE ST., MELBOURNE

SO MODERN AND PRACTICAL
FOR OFFICE SUBDIVISION



Now—more than ever—Cooper Louvres offer a decorative and practical method of subdividing offices. Fitted with "Streamliners," they are sleek and modern—easy to install—and provide privacy, PLUS simple inter-communication. Cooper Louvres look better—and are often cheaper than any other kind of subdividing wall! See the new "Streamliner" model now.



CLOSED: "Streamliners" snugly enclose edge of glass louvres and metal frame.



OPEN: "Streamliners" automatically open at the flick of a lever.

The Cooper Louvre
Streamliner 29/62.51

F. W. GISSING PTY. LTD.

FROM ALL BUILDERS' SUPPLY & HARDWARE STORES

CLAUDE
NEON LIMITED

Our services are available to Architects and Builders as specialists in—

FLUORESCENT LIGHTING

NEON SIGNS, DISPLAYS AND OUTLINING

PORCELAIN ENAMEL SIGNS AND NOTICES

ARCHITECTURAL PORCELAIN FOR—

Shop-fronts, Interiors and all Facings in a wide variety of colours.

•

Detailed recommendations and quotations will be supplied upon enquiry.

SYDNEY • MELBOURNE • BRISBANE • ADELAIDE • PERTH • HOBART • LAUNCESTON • NEWCASTLE

CLAUDE FLUORESCENT LIGHTING ★ CLAUDE NEON DISPLAYS ★ CLAUDE PORCELAIN ENAMEL

Constructional . . . Steelwork

The wise architect and engineer are always ready to prepare designs and schemes embodying the use of structural steel.

"SPECIFY IT IN STRUCTURAL STEEL."
"In Steel there is Strength."

Sole N.S.W. Agents for Expanded Metal Lathing (for plaster work) and Exmet Brick Bonding. Large stocks readily available.



The .. Sydney Steel Co. Pty. Ltd.

Structural Engineers and Steel Merchants.
EDINBURGH ROAD, MARRICKVILLE, N.S.W.
Phone: LA 2805 (4 Lines)
Cables and Telegrams: "SYDSTEEL," SYDNEY.

SPEED UP BUILDING PRODUCTION WITH

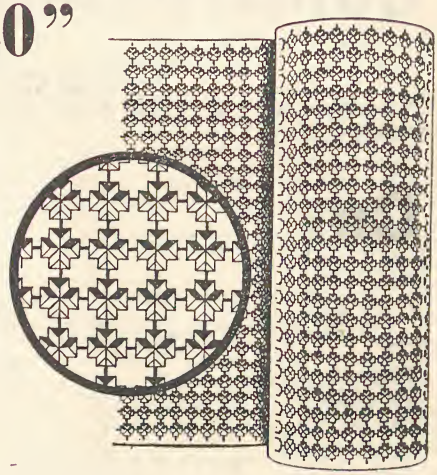
"TWELLO"

BRICANION

THE AMAZING

KEY-MESH

MATERIAL !



Made of rustproof wire into which kilned clay studs are solidly pressed. Crackproof Bricanion provides the perfect base for rendering and is superior to any form of lathing known in Australia.

It is flexible, but immensely strong. It makes sound verminproof walls ideal to Australian conditions. Bricanion is also an ideal base for interior tiling. Twello Bricanion is adaptable to any structure.

CALL, WRITE OR 'PHONE:

Emm. YANNOULATOS (Overseas) Pty Ltd.

28 Martin Place, Sydney.
Telephones: BW 2941-2-3.
Telegrams: "Yannoulatos," Sydney.

Beehive Building,
94 Elizabeth Street,
Melbourne.
Telephone: Central 4496.

CONSULT US ON YOUR

STEEL *REQUIREMENTS*



Imported
STEEL
Available.

Quantities
10 TONS & OVER.
Various Sizes.

We have overseas connections who are able to supply steel in any quantity.

We invite your enquiries for quantities of 10 tons or over, delivered ex-ships at capital cities.

Inspection certificates are available if required.

Ensure continuity of production by placing your order now, for early delivery.

ALSO WIRE NETTING, GALVANISED WATER PIPE, WIRE, GALVANISED IRON, FENCING POSTS, BARBED WIRE, CONDUIT, ETC.

CALL, WRITE OR 'PHONE:

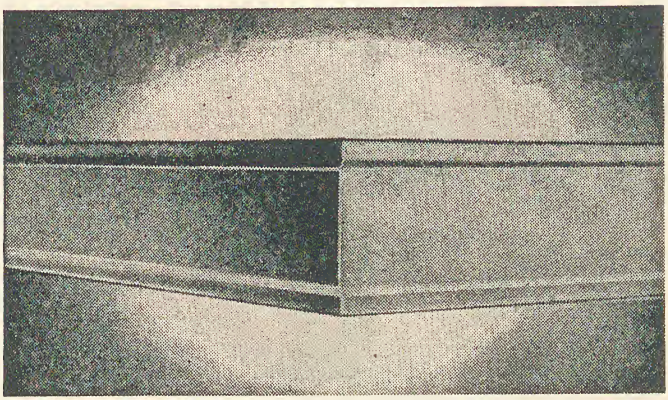
Emm. YANNOULATOS (Overseas) Pty Ltd.

28 Martin Place, Sydney.
Telephones: BW 2941-2-3.
Telegrams: "Yannoulatos," Sydney.

Beehive Building,
94 Elizabeth Street,
Melbourne.
Telephone: Central 4496.

CLEARLINE

The Cold Pressed Steel Awning Fascia



A New Advancement in Fascia Design and Construction that Eliminates Corrosion

CLEARLINE AWNINGS COST NO MORE THAN CONVENTIONAL AWNINGS

The Clearline Steel Awning is a better awning structurally — the fascia plate a deep, cold-pressed moulding of heavy-section flanging steel, has greater rigidity than conventional fabricated fascias. With no external protruding rivets or bolts, or laminated built-up sections there are no points for lodgment of water or moisture to start corrosion. Available in four standard types with one-piece return ends, one-piece steps.

J. MURRAY STEEL WORKS PTY. LTD.

Sutherland & Holker Sts., Auburn, N.S.W. UX 7138.

STEEL AWNING SPECIALISTS FOR OVER 40 YEARS

A
FINISH
OF
RARE
QUALITY—



You'll Appreciate

ROBBIALAC

in the Finish!

MANUFACTURED BY

JENSON & NICHOLSON

(AUST.) PTY. LTD., ALEXANDRIA, N.S.W.

LONDON CALCUTTA JOHANNESBURG

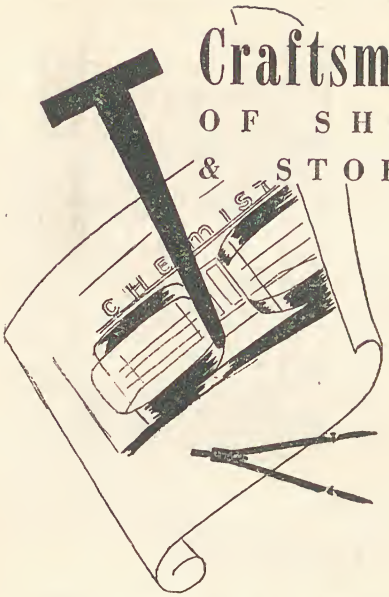
QUALITY PAINT PRODUCTS EST 1821

Craftsmen Builders

OF SHOPFRONTS & STOREFITTINGS

to—

Architects' Specifications



With a lifetime of experience of shopfront installation and working in close co-operation with architects and designers, Sidgreaves undertake to interpret exactly and execute faithfully to structural specifications.

In addition, Sidgreaves employ a highly skilled staff to plan and fashion interior display fittings.

When it's modern shopfronts or storefittings, call in Sidgreaves—Sydney's leading shopfitters.

●

METAL MOULDING

●

STRUCTURAL GLASS

●

MODERN SHOPFRONTS

●

ARTISTIC INTERIORS

●

GLASS MERCHANTS

●

H & E. Sidgreaves Pty. Ltd.

6-36 BORONIA STREET, REDFERN

MX 3241 (5 LINES)

PRECISION BRICKS

are the

BRICKS OF THE FUTURE

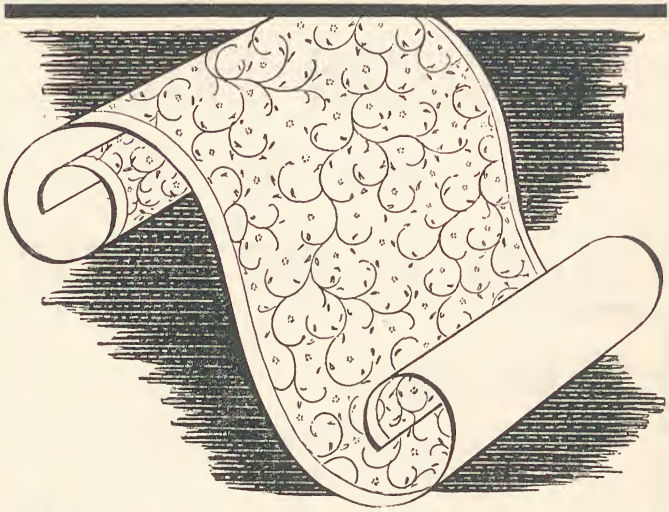
- Superior in strength.
- Mensurally accurate in accordance with Australian Standards Association requirements.
- Cheaper to lay because of their dimensional exactness.
- Excellent in appearance with perfectly shaped frogs and sharp arrises.
- Attractive to architects and builders because of their colour range.
- Used extensively in Government and private work.

PRECISION BRICK PTY. LIMITED

Reg. Office: 115 Pitt Street, Sydney. BW 8266.

Business Address: 1st Floor, 149 Castlereagh St., Sydney. MA 9517.

WORKS: KIRKWOOD ROAD, NORTH CRONULLA.
PHONE: LB 4996.



"Sovereign" WALLPAPERS

Finest, most comprehensive selection in N.S.W.

When you choose wallpaper, you may not have a definite pattern in mind, but you want something that will give your rooms that feeling of "rightness" and tastefulness that is the essence of successful interior decoration.

There is a "Sovereign" wallpaper to meet your individual requirements for every size and type of room.

Ask your local dealer to show you the latest "Sovereign" Catalogue, featuring all the most exclusive English and Continental decorations, or visit our modern showrooms at 324 Pitt Street, Sydney.

Samples forwarded to country clients upon request.

"Sovereign" Wallpapers are exclusive to

JOHN DANKS & SON PTY. LTD.

324-330 PITT STREET, SYDNEY, N.S.W.
391 BOURKE STREET, MELBOURNE, VIC.
(AND AGENTS)

PREFABRICATION

To make their escape from decadent regimes and in the hope of finding a better future for themselves and families many thousands of overseas people are entering Australia every year. Once having settled here these people render glowing reports about our climate, our prosperity, the abundance of good food and our generous living conditions. Indeed, as compared with European standards this country is the Utopia they dreamed of for years. Very nearly everything the human heart desires is available except housing and this is creating a state of tragic chaos in the family life of all, even our own people.

The Building Industry is in high gear to overcome this tremendous need for accommodation. New technique is being applied and the word, "Prefabrication", is freely used by all. But its definition, in most cases, remains obscure. As applied to home building it means nothing more nor less than reorganising the production of homes along the lines of other industrial products such as cars, radio sets, refrigerators, etc. This new angle affords food for thought and opportunity for vigorous action on the part of all concerned with the Building Trades.

Changing the technique of home building from a handicraft to an industry is an accomplishment which few people thought possible. Old methods die hard and it takes an heroic pioneering spirit to alter what is considered unchangeable. Whenever Prefabricated Homes are mentioned in this Commonwealth you will find the name VANDYKE inevitably recognised as being associated with this fascinating method of building homes for the people.

VANDYKE BROTHERS are producing homes, under ideal conditions, at the rate of thirty per week. Constant additions to plant and premises will accelerate this output continually. Builders should write for literature and technical advice.

VANDYKE BROTHERS PTY. LTD.

AT STATION, VILLAWOOD, N.S.W.

POSTAL ADDRESS, BOX 12, P.O.

'Phone: UB 1603. PUNCHBOWL, N.S.W.

SUPPLIERS OF PREFABRICATED HOMES AND INDUSTRIAL STRUCTURES TO

The Housing Commission of N.S.W., Dept. of Works and Housing, N.S.W. Gov. Railways, Snowy Mountains Hydro-Electric Authority, P.M.G. Dept., The Joint Coal Board, The M.W.S. and D. Board.

Protected by C'wealth Patent No. 100.001/35.

For all Classes of

Constructional Timbers

Joinery

also

LOG MILLING

KILN DRYING

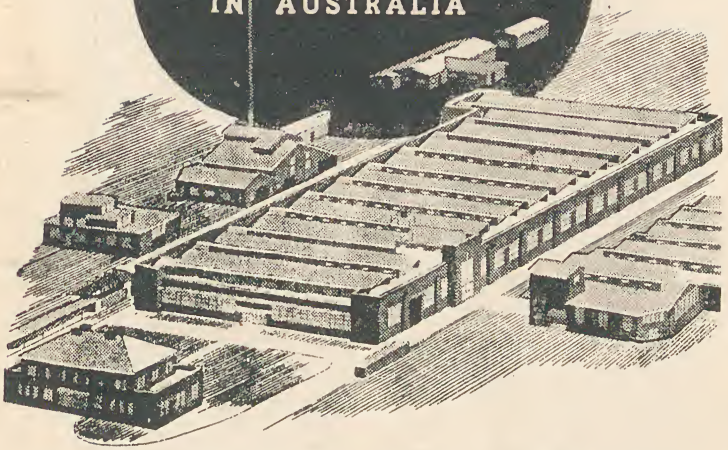
TIMBER IMMUNISING
against borers, etc.

H. McKENZIE LIMITED

Uhrs Point, Rhodes

Tel.: UF 1291

THE MOST MODERN CABLE MAKING FACTORY IN AUSTRALIA



Behind the world-renowned efficiency of C.M.A. Cables are the joint experience and untiring research of twenty-two British companies which, for over 100 years, have set international standards for cable making — the members of the Cable Makers Association. As a result, the Australian factory of C.M.A. is equipped and able to achieve a standard of production and a range of products considerably beyond the scope of any enterprise less surely endowed. C.M.A. has brought Australian industry cable-making resources which are unexcelled anywhere in the world.

CERTIFICATION MARK

C.M.A.

REGD. TRADE MARK No. 19510

C.M.A.

Made in Australia by Cable Makers Australia Proprietary Limited, Liverpool, N.S.W., Overseas Member of the C.M.A.

BACKED BY OVER 100 YEARS OF RESEARCH

Digitized by:



ASSOCIATION
FOR
PRESERVATION
TECHNOLOGY,
INTERNATIONAL
www.apti.org
Australasia Chapter

**BUILDING
TECHNOLOGY
HERITAGE
LIBRARY**

https://archive.org/details/buildingtechnologyheritagelibrary

from the collection of:

Miles Lewis, Melbourne

funding provided by:

the Vera Moore Foundation, Australia

